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IS RADIUM A CURE FOR CANCER OF THE LARYNX?

AN INQUIRY BASED ON A STUDY OF THE END-RESULTS *

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No subject is of greater interest to laryngologists than the treatment of cancer. It might be called the vital question of the day when it is borne in mind that death from cancer is exceedingly painful and that the number of cases is steadily increasing. A judicial, unbiased inquiry into any possible form of cure is always desirable.

In April, 1921, I read a short article on "Radium in Cancer of the Larynx with particular reference to the Dosage and the Dangers in its Employment" before the Section of Laryngology of the New York Academy of Medicine. In it an attempt was made to point out the seriousness of the cancer situation. This situation was made more serious by the injudicious and extravagant claims put forward in behalf of radium, at that time a comparatively new remedy for this disease. As a result, both the public and physicians often tried the new treatment and delayed until too late the employment of the one demonstrated means of cure in the early stages of the disease, operation. The opinion of Dr. D. Bryson Delavan was unqualifyingly endorsed that the word "cure" can be truthfully applied only when such a disease as cancer has been absolutely and permanently eradicated. In spite of the gratification and encouragement felt in reading of the complete disappearance of a cancerous growth, Beck was right when he declared that five years must elapse before a cure can be pronounced. Consideration was then given, first, whether the claim that radium cures cancer of the larynx is borne out by statistics; second, whether there is danger of serious after-results following its use. In a careful search of the literature at that time I discovered reports of eleven cases in which a cure had been claimed, a surprisingly small number in view of the large number of cases in which radium had been used. In only three of these

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* Read before the Section of Laryngology and Otology of the College of Physicians, Philadelphia, Nov. 17, 1926.

1. Harris, T. J.: Radium in Cancer of the Larynx with Particular Reference to the Dosage and the Danger in Its Employment, Laryngoscope **31**:872 (Nov. 21) 1921.

so-called cases of cure, had five years elapsed. Based on these investigations, it was my opinion that up to that time it could not properly be claimed that there was sufficient evidence to warrant the substitution of radium when operation was indicated.

Five years have elapsed since the article was written. During that time an extensive study of the cancer question has been carried on all over the world. Work of the highest order has been done, and while the disease has not been conquered, there is a confident hope that before long a cure will be discovered. This applies with special emphasis to the laryngeal manifestation of the disease. Laryngologists, both here and abroad, have occupied themselves in a constant effort to work out a cure. The current literature for the last five years contains the results of these endeavors. By far the most encouraging work is that of MacKenty,[2] who reported twenty-three out of thirty-three patients, or 66 per cent, cured by laryngectomy for from three to five years. Radium has continued to be used extensively during this time. There are a number of articles dealing with the method of its introduction, but only a few state the number of patients treated and the results secured. Field,[3] the head of the Radium Institute in New York, whose experience has been a wide one, while asserting the value of radium as an aid to surgical measures in its inhibitory influence on cancerous tissue, does not claim that it is a cure and does not report any cures. No records have been found of cures of carcinoma of the larynx at the Memorial Hospital, New York, where radium has been employed as a routine measure. Freer[4] reports thirty-two cases in which radium was used and in twenty-five of which the disease was in an advanced stage. Fourteen of these thirty-two patients, he stated, were "clinically well." Although any work of Freer always deserves consideration, the results which he gives are valueless in helping to form any conclusion in regard to the curative value of radium, as the condition of the patients five or more years after treatment is not given.

Forbes,[5] in an article on "Radium in Malignant Disease of the Esophagus and Upper Respiratory Tract," reports twenty-four laryngeal cases in which the patients were treated with radium. In only one case, in which a hemilaryngectomy had been performed, does he feel that he has relieved the patient. He does not claim a cure in any case. In an article on "Malignant Neoplasm of the Larynx and Esophagus Treated by Radium," read before the American Laryngological Association, 1921,

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2. MacKenty: Tr. Am. Laryngol. A., p. 205, 1922.

3. Field, C. E.: Radium in Cancer of the Mouth and Throat, New York State J. Med. **22**:121 (March) 1922.

4. Freer, O. T.: Carcinoma of the Larynx, J. A. M. A. **79**:1602 (Nov. 4) 1922.

5. Forbes, H. H.: Radium in Malignant Disease of the Oesophagus and Upper Respiratory Tract, Boston M. & S. J. **186**:705 (May 25) 1922.

Forbes states that "the results of treatment are not clear enough to give any positive data in regard to results."

In a recent article on radium treatment of carcinoma of the larynx and laryngopharynx, Imperatori [6] gives an analysis of thirty cases. His summary of the present status of these patients follows:

(*a*) Cured, one (Case 15).

This was a basal cell epithelioma and, as stated elsewhere, it was felt that the cure was effected at the time the biopsy was done, although it is very possible that the few cancer elements at the base of the growth were destroyed by the use of radium. Three 5 mg. needles were inserted for two hours into the outer border of the cord. This patient is now 77 years old and his vocal cord shows no evidence of the site of the growth nor any loss of motility. He has a very good voice.

(*b*) Alive, nine (Cases 7, 8, 12, 13, 19, 21, 26, 27 and 28).

These patients are alive but very weak, and enduring all the tortures and sufferings that only a patient with cancer of the throat has during the last few months of life.

(*c*) Alive and apparently improving, one (Case 29).

This patient neither smoked nor drank. A diagnosis of a precancerous growth was made over a year previous to the report of a squamous cell epithelioma obtained in January, 1926. Radium was applied as noted, but it seemed that the growth was enlarging so a laryngectomy was urged but the patient positively refused any operative measures. He was then referred for high voltage roentgen-ray treatment, and after twenty-one treatments there was a decided decrease in the size of the growth.

(*d*) Alive after tracheotomy, one (Case 20).

(*e*) Alive after thyrotomy, one (Case 30).

(*f*) Alive after laryngectomy, one (Case 21).

The statistics from the radium clinic of the New York Post-Graduate Hospital are equally instructive. They represent patients who had presented themselves at the throat department of the hospital and who were then referred to the radium clinic. The most conscientious work had been carried out by the director of the clinic, the late Dr. George Stuart Willis and his assistant, Dr. G. Allen Robinson. A careful attempt was made to follow up all the patients who were treated. Any one who has tried to do this will recognize the difficulty and the certainty of failure in many instances. The desired information is too often lacking in the records, but is sufficiently complete to warrant being used as a basis for study; altogether, during the years from 1920 to 1923, inclusive, fifty-four patients with cancer of the larynx received radium treatment. Many, or most of these patients, could not be operated on. Some of them received only one treatment; others received repeated treatments. The treatment usually consisted in the internal introduction of radium needles, together with massive doses externally. More or less complete records were obtainable of thirty of the fifty-four patients. Eight died during treatment or within nine

6. Imperatori: Carcinoma of the Larynx and Laryngopharynx-Analysis of Thirty Cases, Arch. Otolaryng. 4:158 (August) 1926.

months after treatment; seven were reported improved and thirteen not improved and two were classed as cured. Of the two patients classified as cured, one must be excluded in this analysis because of the fact that a hemilaryngectomy had been performed. The other, a case of Dr. Forbes,[7] is still living, and there has not been a recurrence of the growth. Statistics can easily lead one astray, and so the improvement noted in thirteen patients must be regarded with due circumspection. Improvement varied from slight to marked, and was to a great extent subjective during or immediately after treatment; it did not represent the exact conditions within the larynx, which had rarely been examined by a laryngologist after treatment.

In the article five year ago eleven cases were reported in which the cancerous growth had disappeared through the use of radium, in only three for an interval of five or more years. I can now report sixty cases—thirty of Imperatori's and thirty from the New York Post-Graduate Hospital—with two cures of nearly five years' duration. What conclusions are warranted from these figures? I believe only one, namely, that radium has not proved itself a cure for cancer of the larynx.

For a long time it was felt that the unsatisfactory results were due to faulty methods in its use. In recent years these methods have been greatly improved, and faulty application cannot properly be given as a cause for failure. The use of radium emanation seeds planted at the circumference of the growth is the latest and most encouraging advance in this respect. Malignant masses are said to disappear as if by magic and without any undue reaction, but the interval of time, only a few weeks, is altogether too short to permit the forming of any opinion as to the eventual outcome. I am forced to admit that I have been disappointed in my early hopes in regard to the use of radium for malignant disease in the larynx, and to say that so far as a cure is concerned, it has proved a failure.

AFTER-RESULTS IN TREATMENT WITH RADIUM

An even more weighty question is the second one raised in my paper of five years ago—"Is there danger of serious after-results from the use of radium for cancer of the larynx? Nothing can be more important than to be able to say that though a remedy may not do good, it will not do harm. This applies with especial significance to the use of radium, because of its tremendously destructive qualities. At the time of my previous article it was my feeling, then shared by numerous observers, that if radium was employed in the numerous cases in which the disease had progressed too far to permit of operation, it would, without injurious effects, serve to assuage the sufferings

7. Forbes: Tr. Am. Laryngol. A., 1925, p. 75.

of the patient and so make euthanasia possible. I then referred to the deep-seated burns that had followed its use either endolaryngeally or in forms of massive doses, but expressed the hope, which was general at that time, that the more extensive employment of it would work out a dosage that would be sufficient to destroy the growth and yet to avoid producing a burn. Field [8] said that, "radium burns now rarely occur" although he declared that "there are many situations which make a radium burn desirable." Such apparently contradictory statements indicate the importance attached by radiologists to the employment of a sufficient dosage to destroy the cancer cell. The effect of radium on cell life is two-fold. Up to a certain dosage it is a powerful stimulant; beyond that point, it kills. All workers have recognized the supreme importance of avoiding doing the first. Case after case is on record in which the patients have become worse after the use of radium. If, then, it is essential that a sufficient strength be used to kill the cancer cell, the question arises as to whether such a dose will not injure and perhaps kill the healthy cell as well.

Much has been written on this phase of the subject. At the time of my original article, it was generally believed that the healthy cell had a resisting power to radium far in excess of that of the cancer cell. The increasingly prevailing opinion in recent years is that this is not so. Callison [8] has made a careful study of two cases of carcinoma in which the patients were treated with radium. The following is from his paper:

> Radium emanations will eradicate lawless growths only in so far as they possess the power to devitalize vital tissues. In the treatment of new growths, therefore, the question is which tissue possesses the greater amount of vitality. When penetrating rays are permitted to enter the body at any point, their stimulating or destructive effect is exerted on every cell with which they come in contact. Up to a certain point the effect of the application is stimulating, but when stimulation becomes too great for the cell to endure, the cell dies. In other words, the cell is caused to perform a great amount of work and if the stimulation is too great the cell dies from exhaustion. If cells A and B are placed side by side in the body and it is desired to destroy cell A by penetrating rays and to leave cell B intact, then cell B must have the greater vitality and this difference must be such that after cell A has succumbed to the rays cell B can still recover from the damage done to it; if cell A has the greater vitality or resistence then cell B will be destroyed and cell A will remain viable, the effect being just the opposite to that desired. When these rays, properly screened, are permitted to enter the body they are presumed to exert an equal effect on the skin and for a considerable distance beneath it, and there are some reasons to think the destructive effect on different types of cells is not widely different. When epithelial cells have reverted to an embryologic form and have taken on embryologic activities, there is every reason to believe that they have an increased resistance to destructive agents. If this is true, then the connective tissues, or supporting frame-work of the lawless growth should suffer more from exposure to the radium emanations than the tumor cells themselves.

8. Callison, J. C.: Radium in Carcinoma of the Larynx, Laryngoscope **32**: 180 (March) 1922.

It is Callison's opinion that "This leaves open to serious question the oft repeated statement that radium and roentgen rays have a selective action upon new growths."

The statement equally strong is made by Koch [9] when he says:

> The cancer cells thus stimulated by the irradiation, are of higher vitality than the normal tissue and do not succumb to the ever increasing tendency to necrosis initiated by the irradiation. On the other hand the normal cells start to die off, at first slowly, then more rapidly with time in geometric progression. . . . A local ever spreading necrosis is established and a fatal general poisoning is initiated. Thus the patient to whom roentgen ray and radium is applied is potentially doomed even though the cancer has been eradicated by the antitoxin.

In complete agreement with the opinion of Callison and Koch is that of Crile, quoted by Koch,[10] who states:

> If cancer is stimulated by injury, partial operation, inflammation, chemical agents, roentgen-ray, radium, heat or electricity, the resultant struggle and survival kill off the weaker cells leaving the stronger. When a massive treatment is given, any cells which survive will be the fittest, hence, the return growth will be at the pace of the strongest or fittest cancer cells, not of the less stronger cells that did not survive. The combination of diminishing vigor on the one hand and the stepping up of the electrical potential on the other bring about the unbalance required for cancer.

These quotations are sufficient to indicate the opinion at the present day regarding the selective action of radium. It represents the views held by an increasing number of those who have been engaged in recent years in the use of radium in this field. It serves to explain in a large measure the disappointing results, including the fatalities, which I have reported.

CAUSES OF FAILURE OF TREATMENT WITH RADIUM

The common explanation for the prevailing unsuccessful results has been that the proper dosage was not employed, and thus instead of destruction of the new cell growth, stimulation was produced.

The constant endeavor of radium workers has been to employ a dosage sufficiently strong to produce the desired destructive action but without injury to the healthy cell.

Up to the present time this has been a failure. The new method of introduction, using radium emanation seeds, may accomplish the desired results. Considering the statements just quoted, it would appear that the explanation for the failures is in most cases to be found in a toxemia produced by the breaking down, without recovery, of the healthy cell by the radium introduced. It is only necessary to recall the usual clinical picture in the cases in which radium has been used. One sees a man, usually beyond the meridian of life, who has

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9. Koch: The Mechanism of the Recovery Process, Bull. Koch Cancer Foundation, May, 1926, p. 3.

10. Koch: Bull. Koch Cancer Foundation, May, 1926, p. 6.

suffered for months in a vital organ, the condition being so advanced as to make operation impossible; he is cachetic and underweight, and perhaps already swallows with difficulty. Often after the first application there is much reaction, and while there may be a shrinking of the growth there is also a gradual increase in the severity of the condition. After the third or fourth application not merely a local but also a serious general condition can be recognized. What is clearer than that there is a toxemia involving the entire system, and when the ulcerated broken down condition of the larynx is visualized, what other source for the toxemia is needed!

Beyond question this is the true cause for the nine fatalities reported that occurred in the course of treatment, as well as an important contributing factor in the undoubtedly fatal issue in the many more who disappeared from observation after one or two treatments.

This theory is not a new one. The late Dr. Willis admitted that toxemia would follow the use of radium. It was his constant endeavor, by careful examination of the general condition of the patient, to select such dosage as would reduce the toxemia to a minimum, and, by administrating suitable medication, to combat and to overcome it as speedily as possible. In one of his discussions, Willis [11] states his views on this subject:

> The two main factors necessary for success in the treatment are, first, that the growth is accessible to the action of the rays of radium, and, secondly, that the physical condition of the patient is such that they will withstand the treatment. . . . Our experience in the New York Post-Graduate Hospital has been that it is necessary to treat the patient rather than the growth, therefore our doses are based upon the theory that a patient can take care of a certain amount of absorption due to the disintegration of the growth.

Willis was perhaps the first to recognize this danger in the use of radium. He sought earnestly to overcome it, but failed, so far as treatment of laryngeal carcinoma is concerned, for he was confronted with what proved to be an impossible task, namely, the destruction of the growth and at the same time the control of the toxemia which followed.

It is human nature to report successes just as it is to neglect to report failures. In spite of the widespread use of radium during the past ten years, the literature is so lacking in reports of favorable results, that one can assume that the results of the many who used it were the same as those reported by Imperatori from the Manhattan Clinic and from the clinic at the New York Post-Graduate Hospital.

The staff at the New York Post-Graduate Hospital was among the first to employ radium in the larynx, at the outset, only for benign growths.

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11. Willis, G. S.: Radium Therapy in Cancer, M. Rec. **100**:793, 1921.

The results secured in the removal of these were so encouraging as to lead to the use of it for malignant neoplasms. For a time it was believed that a remedy had been found to take the place of the knife or to be used effectively when surgical intervention was contraindicated; however, this belief was not justified, as a number of patients died.

Radium was still used, however, as it was thought that the failures were due to improper dosage and to faulty technic in introduction.

Gradually, as not merely failures resulted, but as the suffering apparently was increased under the treatment and death was hastened, the conclusion was that radium in the treatment of malignant disease of the larynx up to date has been harmful.

Personally, I have ceased to use radium unless for some exceptional reason. If the case has reached the stage in which operation is ruled out, such measures are used as will make the patient as comfortable as possible without adding to his suffering, by increasing the obstruction in the larynx, as radium often has seemed to do. For such obstruction a simple tracheotomy has been seen to give the desired relief in more than one case.

If operation is indicated, radium is not substituted. In case operation is refused, radium would not be advised until other measures had been carefully considered.

In a discussion on the treatment of cancer of the larynx, Dr. Chevalier Jackson,[12] after declaring himself in favor of operation, said: "If I had a cancer on the posterior end of the cord, and the arytenoid joint was still movable I would ask that radium be applied."

I have great respect for Dr. Jackson's opinion, but much more is known now of the effects of radium than when he made this statement four years ago, and I doubt whether he would be prepared to say the same thing at the present time. Certainly, if I had cancer and the condition was too far advanced for an operation I would prefer to endure the disease rather than to risk the uncertain results of radium treatment.

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12. Jackson: Tr. Am. Laryngol. A., 1922, p. 233.

DIAGNOSIS OF CHRONIC MAXILLARY SINUSITIS

COMPARATIVE VALUE OF ROENTGENOGRAPHIC AND PHYSICAL OBSERVATIONS *

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The development of roentgenography in the examination of the skull has been a great asset to the rhinologist in the diagnosis of disease of the accessory nasal sinuses. Before the possibilities of the use of the roentgen ray in surgery of the nose were discovered, it was necessary to diagnose these diseases entirely on the history of complaints and the objective clinical data.

The roentgen-ray examination of the accessory nasal sinuses is important and has a definite place in the diagnosis of diseases of these cavities, but there is a tendency among medical men to rely too much on this examination. More dependence should be placed on the clinical history and clinical signs elicited by a careful observation of the patient, and on the roentgen-ray examination used as an adjunct to these observations.

HISTORICAL

Prior to 1906, little progress was made in the development of the use of the roentgen ray in rhinology. This was due largely to the lack of enthusiasm on the part of the rhinologist as well as the roentgenologist. Scheier,[1] in 1897 and 1898, was the first to diagnose pus in a nasal sinus by the use of the roentgen ray and to confirm his diagnosis by washing the pus out of the sinus. In 1900, Regnier and Glover [2] published their work on roentgenographic researches on the topographic relations of the brain, the frontal and maxillary sinuses, and the venous sinuses of the dura mater, to the walls of the skull. Philip,[3] in 1901, made a roentgenogram of the frontal sinus, showing a cannula passing into it through the nose. This required an exposure of eight minutes with a distance of 20 inches from the tube to the plate. The first work of

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* Thesis submitted to the Faculty of the Graduate School of the University of Minnesota in partial fulfilment of the requirements for the degree of Master of Science in Otolaryngology, December, 1926.

1. Scheier, M.: Ueber die Verwerthung der Röntgenstrahlen in der Rhino- und Laryngologie, Arch. f. Laryngol. u. Rhinol. **6**:57, 1897.

2. Regnier, Paul and Glover, Jules: Radiographic Researches on the Topographical Relations of the Brain, the Frontal and Maxillary Sinuses, and the Venous Sinuses of the Dura Mater to the Walls of the Skull, Lancet **1**:525, 1900.

3. Philip, J. H.: The X-Ray in Determining the Limits of the Frontal Sinus, J. A. M. A. **38**:764, 1902.

much importance was recorded in 1903, when Killian [4] published his roentgenograms illustrating the accessory nasal sinuses, which stimulated a more general interest in the application of the roentgen ray to nasal surgery.

Pfahler,[5] in his paper of 1903, mentioned roentgenography of the accessory nasal sinuses and discussed the possibilities of the roentgen ray in locating lesions of the brain. Coakley,[6] in 1905, was about the first man in this country to give his results with the roentgen ray in the diagnosis of disease of the accessory nasal sinuses, but his publications were disappointing because his technic was not well described. One year later his roentgenologist, Caldwell,[7] published a paper on roentgenography of the accessory nasal sinuses. In 1916, Chisholm,[8] after a series of experiments with the roentgen ray, concluded that the appearance of the diseased sinus in the roentgenograms was due to the fluid which it contained, whether free in the sinus or held in the thickened mucosa. With the roentgen ray he was able to demonstrate the difference between a normal and a diseased sinus. Mosher,[9] in 1906, described three cases in which he had diagnosed pus in the sinuses by means of the roentgen ray, and verified his diagnosis at operation. The experimental work of Albrecht,[10] in 1907, and his clinical observations on accessory nasal sinuses demonstrated the usefulness and the limitations of the roentgen ray in the field of rhinology. He recommended it in conjunction with the physical examination of the nose, in diagnosing sinus diseases.

Since this time, many valuable experiments and contributions have increased the usefulness of the roentgen ray. In 1907, Beck [11] described his technic for roentgenography of the accessory nasal sinuses. Skillern and Pfahler,[12] in 1912, related their methods for making roentgenograms

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4. Goldmann, E., and Killian, Gustav: Ueber die Verwendung der X-Strahlen für die Bestimmung der nasalen Nebenhöhlen und ihrer Erkrankungen, Beitr. z. klin. Chir. **54**:1, 1907.

5. Pfahler, G. E.: Cerebral Skiagraphy, Am. J. M. Sc. **128**:1028, 1904.

6. Coakley, C. G.: Frontal Sinusitis, Diagnosis, Treatment and Results, Ann. Otol., Rhin. & Laryng. **14**:431, 1905.

7. Caldwell, E. W.: Skiagraphy of the Accessory Sinuses of the Nose, Am. Quart. Roentgenol. **1**:27, 1907.

8. Chisholm, W. A.: Skiagraphy in the diagnosis of frontal sinusitis, Ann. Otol., Rhin. & Laryng. **15**:979, 1906.

9. Mosher, H. P.: The Use of the X-Ray in Sinus Disease, Laryngoscope **16**:114, 1906.

10. Albrecht, Walther: Die Bedeutung der Röntgenographie für die Diagnose der Nebenhöhlenerkrankungen, Arch. f. Laryngol. u. Rhinol. **10**:175, 1907.

11. Beck, J. C.: Radiography and Transillumination in Diagnosis of Sinus Disease, Laryngoscope **17**:830, 1907.

12. Skillern, R. H., and Pfahler, G. E.: The Roentgen Ray as an Aid to Diagnosis, Tr. Am. Laryngol., Rhinol. and Otol. Soc., p. 14, 1912.

of these sinuses. The book published by Turner and Porter [13] in 1912 probably gives the best and most systematic description yet made of the accessory nasal sinuses from a roentgenologic standpoint. The valuable work done by Berry [14] and that by Finzi and Hett,[15] both published in 1915, deserve special recognition. The results of the researches and studies of roentgenology of the head by Schoenberg [16] are a valuable contribution. His book, "Die Röntgentechnik," was published in 1919. In the two volumes on "Radiography and Radiotherapeutics" by Knox,[17] published in 1923, there is a good description of methods for roentgenography of the accessory nasal sinuses.

MATERIAL AND METHODS OF STUDY

A study of the comparative value of the clinical observations and the evidence furnished by the roentgen ray in the diagnosis of chronic disease of the maxillary sinus has been made in a series of 300 consecutive cases observed in the Mayo Clinic.

In most of the cases the patients were referred from the general diagnostic sections of the clinic to the ear, nose and throat section for an investigation of the sinuses as possible foci of infection or as a factor in symptoms or complaints. A roentgenogram was always made.

When the patients were first seen, the clinical history and symptoms were given careful consideration and the roentgenograms studied. The patients were questioned regarding previous operations on the nose, attacks of maxillary sinusitis or chronic nasal discharge following infection of the upper respiratory tract. Inquiry was made concerning headache and its character, pain and soreness in the cheeks or occasional unpleasant odor in the nose which was more noticeable when the patients stooped over, and whether the symptoms followed the extraction of teeth.

The nose was examined for mechanical obstructions, such as a deviated septum, hyperplastic turbinates or polypoid growths. It was noted whether the mucosa appeared normal or showed pathologic changes, such as hyperplasia, hypertrophy or atrophy and crusting. When there was a history of a previous operation, an effort was made to determine what had been done.

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13. Turner, L., and Porter, W.: The Skiagraphy of the Accessory Nasal Sinuses, New York, Paul Hoeber, 1912.

14. Berry, H. M.: Radiography in the Diagnosis of Disease of the Accessory Nasal Sinuses, Arch. Roentgen Ray **19**:419, 1915.

15. Finzi, N. S., and Hett, G. S.: Roentgenography of the Maxillary Antrum, Laryngoscope **15**:713, 1915.

16. Schoenberg, A.: Die Röntgentechnik, Hamburg, Lucas Grafe and Sillem, 1919.

17. Knox, R.: Radiography and Radiotherapeutics, London, A. and C. Black, 1923.

If a discharge could be demonstrated on the first inspection, an investigation was made to determine its source. The nose was well cleansed. If discharge was not seen, the middle meatus was probed to determine whether a pyocele was present. Suction was applied to the nose and a second observation was made. This procedure is essential, as the situation of a discharge in the nose, when first seen, does not establish its origin. Patients with a nasal discharge blow their noses frequently and move the discharge from its original position. Often the contour of the nose is such that the discharge from a sinus will be directed away from its ordinary situation. The large amount of discharge from a sinus often will fill the entire middle meatus.

If a discharge could not be seen in the nose when it was inspected the first time, suction was applied and a second observation made. If it was demonstrated in the region of the hiatus semilunaris after suction, the clinical observations were considered positive.

If a discharge could not be seen, the patient was advised to return the following morning without blowing the nose. Observations were made again and suction used, if indicated. If a discharge was not discovered this time, the clinical observations were considered negative. Transillumination of the maxillary sinus was not used in this series.

A diagnostic puncture of the maxillary sinus was made through the inferior meatus, and the sinus was washed out. This was done in all of the cases in which positive clinical or roentgenographic observations of the maxillary sinus were made, and in several instances in which the roentgenograms and clinical observations were negative, when the history and complaints of the patient warranted it. This procedure was used for all of the patients with secondary atrophic nasal mucosa, if much crusting and discharge were present. The nose was well cleansed and the usual methods for a clinical diagnosis were applied.

The influence on the roentgenographic observations of the exact pathologic change which has taken place in the mucosa of an accessory nasal sinus is difficult to determine. Holmes and Ruggles [18] have observed that accumulated pus may be washed out of a sinus which on the preceding day looked normal in the roentgenogram. Lillie [19] has made similar observations.

Albrecht,[10] in his experiments with the maxillary sinus in a skull, found that pus increased the density of the roentgen-ray shadow, but he observed clinically that when a maxillary sinus with a thickened mucosa and purulent contents was washed out and roentgenograms were immediately made, there was practically no difference between the

18. Holmes, G. W., and Ruggles, H. E.: Roentgen Interpretation, Philadelphia, Lea and Febiger, 1919.

19. Lillie, H. I.: Personal communications.

shadows resulting before and after syringing. Chisholm,[8] in his experimental researches with the roentgen ray, was able to show that the shadow made by a sinus in a roentgenogram was due to pus. Turner describes a case of ozena in which maxillary sinusitis was diagnosed from the roentgenogram, but in which investigation showed that the sinus was free from any discharge. Lillie [19] has observed cases with a positive roentgenographic diagnosis of sinusitis which were actually negative when explored. Albrecht,[10] in his observations on the diagnosis of maxillary sinusitis, found that in certain cases with positive roentgenograms, investigation would give negative results. At necropsy, a thickening in the lining mucosa and varying amounts of granulation were noted. He believes that in the acute infections the pus contained in the sinus produces the shadow in the roentgen ray, but that in cases of chronic sinusitis the infiltrated mucosa and the granulations present are the most important factors in causing the shadows.

From these clinical observations and those made in this series of 300 cases, it would seem that, during the early stages of infection of a sinus or when its mucous lining is but slightly engorged, the roentgenogram may be negative when the sinus contains pus. Later, more extensive changes take place in the mucoperiosteal lining of the sinus and remain permanent after the infection has become quiescent. This scarred and infiltrated mucosa may be of such consistency as to give a positive roentgenogram.

A maxillary sinus was regarded as negative, and further investigations were not made when the clinical observations and exploration did not show a discharge. It was considered that any nonsecretory pathologic change would not be detrimental to the patient's health, and that operative interference was not indicated. This, however, does not apply to tumors and malignant lesions.

RESULTS OF INVESTIGATION

In this series of examination of 300 patients with maxillary sinusitis, there were 127 cases in which clinical observations and roentgenograms were both positive. Investigation of the sinus by puncture showed positive results in all but three of the 127 cases; of the three with negative results, the ethmoid was involved in one, and the frontal sinuses in two. There were twenty-three cases with positive clinical but negative roentgenographic evidence. Investigation revealed that in seventeen patients the sinuses contained thick mucus or mucopurulent clots and in three pus. The maxillary sinus was normal in two cases of anterior ethmoiditis and in one case of frontal sinusitis.

The cases with positive roentgenograms and negative clinical observations are probably the most difficult in which to make a diagnosis of a sinus infection. Ninety such cases were seen, and a diagnostic puncture

of the sinus was made on the roentgenographic observations alone. The sinuses were proved positive in only fifteen of these, which included seven cases of cystic sinus and two in which it was possible to observe the nose but once before exploratory puncture, so that a careful diagnosis was not made clinically. The six remaining cases were those in which the clinical observations in the nose were negative by the usual methods of diagnosis, possibly due to an error in technic.

A diagnostic puncture of the maxillary sinus was made in sixty cases with normal clinical observations and negative roentgenograms. These sinuses were all proved negative except one, which was cystic and contained a thin bloody fluid. There were eight cases in which a cystic maxillary sinus was revealed by exploratory puncture; in seven the roentgenograms of the sinuses had been positive, and in all the clinical observations had been negative.

Value of Clinical and Roentgenographic Observations in Diagnosis of Chronic Maxillary Sinusitis

	Cases	Results of Investigation	Cases	Percentage of Error in Diagnosis	
Clinical and roentgenographic observations positive	127	Negative Positive	3 124	2.36	(Combined clinical and roentgenographic)
Clinical observations positive and roentgenographic observations negative	23	Negative Positive	3 20	13.05 86.95	(Clinical) (Roentgenographic)
Roentgenographic observations positive and clinical observations negative	90	Negative Positive	75 15	83.33 16.66	(Roentgenographic) (Clinical)
Roentgenographic and clinical observations negative	60	Negative Positive	59 1	1.66	(Both Combined)

In 160 cases of maxillary sinusitis observed in this series, thirty cases could be traced to direct extension of dental infection. In seven cases there was an alveolar fistula into the sinus cavity.

DIFFICULTIES IN CLINICAL DIAGNOSIS

There are several factors in certain cases which make a positive clinical diagnosis difficult: (1) the sinus may have emptied its contents immediately before examination; (2) the content of the sinus may be of such consistency that suction will not aspirate it through the ostium, and (3) there may be some mechanical obstruction to the ostium of the sinus, such as a polyp or a hyperplastic middle turbinate.

DIFFICULTIES IN ROENTGENOLOGIC DIAGNOSIS

Besides chronic inflammation, there are several normal and pathologic factors which modify a roentgenogram of the maxillary sinus: (1) the angle of exposure; if the petrous portion of the temporal bone is pro-

jected in line with the sinus, it will appear cloudy; (2) age of the patient; in the young the size and shape may be misleading before the sinus has fully developed, and in the aged the density of the bone is increased; (3) sex, as the bony walls of the maxillary sinus are usually thicker in men than in women; (4) asymmetry in certain cases; (5) previous operations on the sinus which may result in a thickening or a thinning of the mucosa; (6) tumors involving the sinus or the region around it, and (7) foreign bodies in the sinus or close to it.

COMMENT

It is interesting that 35.9 per cent of the maxillary sinuses that showed shadows in the roentgenograms did not contain pus when examined, whereas 25.3 per cent of the sinuses which did not show shadows contained pus when punctured. From this comparison of the relative value of the positive and the negative roentgenograms, it is apparent that one can place a little more reliance on a negative roentgenogram as adjunctive information than on a positive.

In making a diagnosis of disease of the accessory nasal sinuses, much importance may be attached to the physical examination. Lillie [19] emphasizes the significance of careful observation of the nose and the use of suction, if indicated, before making a definite diagnosis of the condition of a sinus. He believes that the roentgen ray should be used to show the conformation of the sinuses and to supply adjunctive information in the diagnosis of sinus disease. Orton [20] expresses the same opinion in his paper on the roentgen-ray examination of the accessory sinuses of the nose, and Ballenger [21] says that in the diagnosis of disease of the accessory nasal sinuses the main reliance should be placed on the clinical observations, while the roentgen ray should be given secondary place.

SUMMARY AND CONCLUSIONS

Ninety-two per cent of the cases in this series could be diagnosed by means of the clinical data alone; in 67 per cent of the cases a diagnosis might have been made from the roentgenographic observations, while 98 per cent were diagnosed from the clinical and roentgenographic observations combined. As evidence of diagnosis, negative roentgenograms were found to be 10 per cent more reliable than positive roentgenograms. Eighty-seven per cent of the cases with cystic maxillary sinuses were diagnosed by roentgenograms, while none could be diagnosed from the clinical observations.

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20. Orton, G. H.: X-Ray Examination of the Accessory Sinuses of the Nose, Proc. Roy. Soc. Med., Elect.-Therap. Sect. Part 1, **3**:44, 1909.

21. Ballenger, H. C.: A Study of 100 Cases of Suspected Chronic Nasal Accessory Sinus Disease with a Report of the X-Ray Findings, Illinois M. J. **36**:316 (Dec. 19) 1919.

Interpretation of the roentgenogram is of most value when made by the rhinologist who is familiar with the clinical observations in the particular case.

Almost 19 per cent of the diseased maxillary sinuses could be traced to extension of dental infection.

From the investigation of 300 maxillary sinuses, it would seem that a diagnostic puncture of this sinus is justifiable when there is any suspicion regarding its condition. This is the only means of making a correct diagnosis. When the history or complaints of the patient are such that disease of this sinus must be ruled out, an exploratory puncture can be made without hesitation, regardless of the roentgenograms or the clinical observations.

In this particular group of cases there were not any untoward results from a diagnostic puncture and washing out of the maxillary sinus.

AN EASIER METHOD OF INTRODUCING THE ESOPHAGOSCOPE

FURTHER NOTES *

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In a previous article in this journal [1] I described a simplified procedure for performing esophagoscopy. Since its publication, continued study with this method has resulted in further simplification.

The method as described in the former article consisted briefly of the following steps: After proper preliminary study and cocainization, with the patient in the horizontal position and head properly held, the esophagoscope is introduced in the usual manner to the contracted cricopharyngeus sphincter. A flexible, silk-woven, olive-pointed esophageal bougie (Jackson type, 8 French scale) is then passed down the esophagoscopic lumen to the contracted cricopharyngeus and about 0.5 cm. beyond the distal lip of the esophagoscope. This is repeated once or twice, and as the cricopharyngeus sphincter is felt to relax the bougie is passed 1 or 2 cm. farther down the esophagus. The electrically lighted esophagoscope under full vision is passed gently along the bougie, much as a styletted urethral sound is passed along the previously introduced stylet. When the distal end of the esophagoscope is engaged by the cricopharyngeus or is just below it, the bougie is withdrawn as the esophagoscope "rides" over the bougie farther down the esophagus, and the examination proceeds as usual.

The latest modification of my method follows. Instead of introducing the esophagoscope alone and then passing the bougie into the esophagoscope, it was found that by first inserting the bougie into the lumen of the esophagoscope, the two instruments may be inserted simultaneously. The olive tip of the bougie should be at the lip (distal opening) of the esophagoscope. The proximal portion of the shaft of the bougie as it emerges from the upper end (proximal opening) of the esophagoscopic canal should be held with the tip of the right index finger against the upper orifice (or collar) of the esophagoscope. The time saved, while only a few seconds, relieves the patient of the momentary discomfort due to involuntary gagging or involuntary spasm of the cricopharyngeus while the esophagoscope is being inserted and the bougie is being placed in its lumen.

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* From the Bronchoscopic Clinic, Hospital for Joint Diseases.

1. Mandelbaum, M. Joseph: An Easier Method of Introducing the Esophagoscope, Arch. Otolaryng. **4**:307 (Oct.) 1926.

Instead of holding the handle of the bougie fixed against the collar of the esophagoscope with the first phalanx of the right index finger, one may use a special bougie holding-clip, which I recently devised. This clip (fig. 1 *A* and *B*) fits over the upper end of the esophagoscope, to which it is fastened by a small set-screw, and has two spring-clip projections, which project slightly into the upper lumen of the tube and hold the shaft of the bougie in the desired position. This permits introduction of the esophagoscope and bougie together and gives entire freedom of the right hand and fingers for the manipulations necessary to introduce the esophagoscope. The instrument is passed to the contracted cricopharyngeus. Then the bougie, its upper end still in the grasp of the spring-clips, is gently and under full vision slid further down as described, and the esophagoscope slides along the bougie on

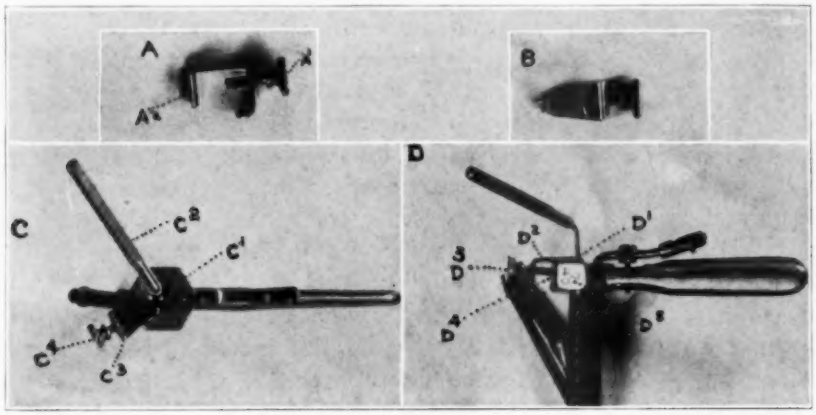

Fig. 1.—*A* is a clip (lateral view) for holding the shaft of esophageal bougie in position against the collar at the upper end of the esophagoscope; A^1, adjustable set-screw; A^2, spring-clips between which shaft of esophageal bougie is held; *B* is a view of the holding-clip from below; *C*, view from above of the assembled esophagoscope, holding-clip and esophageal bougie; C^1, collar at the upper end of the esophagoscope; C^2, offset handle of esophageal bougie; C^3, the holding-clip fastened against the collar of esophagoscope by means of adjustable set-screw (C^4); *D* is a side view of the assembled esophagoscope, esophageal bougie and bougie holding-clip; D^1, shaft of the offset handle of the esophageal bougie held in the springs of the holding-clip; D^2, the holding-clip; D^3, adjustable set-screw of the holding-clip, the tip of which (*D4*) is held against the collar (*D5*) of the upper end of the esophagoscope.

relaxation of the cricopharyngeus. Once past the latter, the bougie is withdrawn simultaneously with the holding-clip, which can be unfastened quickly.

Originally I used the Jackson esophageal bougie, the straight handle of which is a direct continuation of the thin metal shaft. I found that the fingers in grasping the straight handle of the bougie often interfered with sight through the esophageal tube. I then found that by bending

the handle of the Jackson bougie (fig. 2 *B*) at an obtuse angle, I could use a bougie with a shorter shaft, thus permitting better control of the flexible tip. The bent handle prevented visual obstruction, as the examiner's fingers were out of the line of vision.

In addition to further simplification of my method in our clinic, we found that by its use less cocaine was needed in local anesthetization, and that the preliminary hypodermic injection of morphine could be dispensed with.

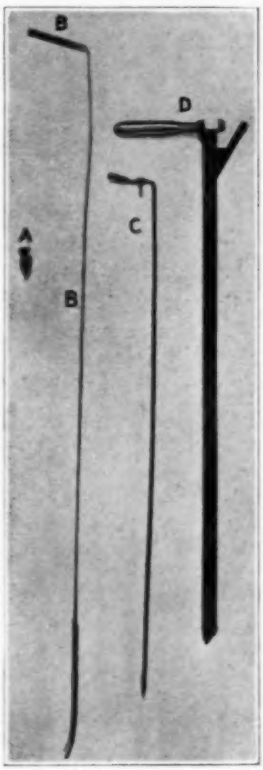

Fig. 2.—Instrumental armamentarium for performing esophagoscopy by the author's method. *A* is the holding-clip for the bougie; *B*, the esophageal bougie with offset handle (B^1); *C*, the light carrier; *D*, the esophagoscope.

Recently I have found that in patients at or past the age of puberty, the esophagoscope could be introduced by this method with the patient in a sitting posture, not only making the entire procedure a much less formidable one, but also causing subsequent or repeated esophagoscopies to be less feared.

The sitting posture in the majority of cases has many advantages. First, the fact that the patient does not need to climb on an operating table prevents the arousing of his defense reflexes. With his mind at

ease, his muscle tension and consequent resistance, voluntary and involuntary, is greatly lessened. In some persons the resistance is entirely overcome. Second, when the patient is properly prepared, that is, has not had food, solid or liquid, for from six to twelve hours preceding the examination, the sitting posture prevents regurgitation of liquid contents of the stomach into the esophagus, which obscures the distally lighted instrument.

The need of the pharyngeal and esophageal suction tip is practically eliminated with this posture.

The patient is seated on a stool or box from 12 to 14 inches (30 to 35 cm.) high; the examiner stands at the patient's back with his leg slightly flexed on his thigh, and his knee bent to fit easily into the mid-dorsal curve of the patient's spine. The patient is told to relax and to hold his spine as supple as possible. With the patient's head well extended on his neck, and the chin high in the air, the esophagoscope, already containing the bougie in its lumen, is introduced.

This method may be used in any posture mechanically suitable for esophagoscopy. The bougie holding-clip will fit all sizes of Jackson esophagoscopes.

The instruments are made by Pilling.

The interest shown following the original description in this journal is gratifying, and I feel that, once mastered, this method will appeal to the esophagoscopist as a simple, safe and less distressing method of passing the esophagoscope.

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PERORAL ENDOSCOPY

ITS USE IN COMPLICATIONS FOLLOWING OPERATIONS ON THE NOSE AND THROAT *

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Peroral endoscopy, including direct laryngoscopy, bronchoscopy, esophagoscopy and gastroscopy, constitutes a special field in medicine, and requires for its safe and efficient performance special training and the skill that comes from long practice in working through a tube, using only one eye. The otolaryngologist is accustomed to monocular vision, and quickly acquires the ability to interpret correctly the picture seen through the endoscopic tube. He is also familiar with the landmarks of the pharynx and larynx, and is accustomed to operative work and the special technic that is required in the upper air and food passages. The first requisite in the work is an adequate instrumentarium. Small tubes are required for infants and longer tubes for adults. In short, the tube must be adapted to the size of the passage to be examined, and the accessory instrumentarium must be proportionate to the size of the tube. There is no universal endoscopic tube. The instrument for adults will kill an infant. The length of instrument used in an infant will not accomplish the desired result in an adult. Tubes of small diameter are required to enter peripheral bronchi in the adult, but the length must be adequate to reach the periphery of the adult lung. Notwithstanding these well known facts, a number of cases have been reported in the past in which attempted examination of the child with an adult tube has been followed by fatal results.

Endoscopy is most safely and most successfully performed without an anesthetic or with only a local anesthetic; to carry it out with safety and precision, an endoscopic team, thoroughly drilled in the technic of the work, is necessary. This is accomplished best by two or more endoscopists working together.

It would seem necessary that every laryngologist should be prepared to examine the larynx of patients of any age. In young children the mirror is useless for this purpose. The diagnosis of laryngeal diphtheria may depend on the taking of a swab, for smear and culture, directly from the larynx, and direct laryngoscopy is the only means by which the larynx of infants and young children may be examined. Again,

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* From the Chevalier Jackson Bronchoscopic Clinics.

Otolaryngology, Colorado Springs, October, 1926.

* Read before the American Academy of Ophthalmology and Otolaryngology, Colorado Springs, October, 1926.

differential diagnosis of an ulcerative lesion of the larynx may necessitate biopsy. This can be most accurately done by direct laryngoscopy.

The diagnosis of laryngeal stenosis may call urgently for bronchoscopy. Whether or not the otolaryngologist shall prepare himself to use bronchoscopy in cases of foreign body obstruction and esophageal disease is a question that each one must decide for himself. Foreign bodies in the larynx may easily fall into the bronchus or esophagus during attempts at removal and so require bronchoscopy or esophagoscopy. Internists and thoracic surgeons have come to regard blind methods in the diagnosis of esophageal disease as obsolete, because at best such methods can only be inferential and are always extremely dangerous. For consultation and direct inspection of the esophagus, they naturally turn to the otolaryngologist for esophagoscopy.

An infective postoperative pulmonary condition may call urgently for a bronchoscopy, or a foreign body accident occurring during an otolaryngological operation may demand a bronchoscopy or an esophagoscopy. The otolaryngologist who is trained and expert in peroral endoscopy will be able to care for the postoperative complications that may occur in his own practice, although under these circumstances he may prefer to have the responsibility taken by a confrère. In this connection I should like to present a group of cases in which foreign body accidents occurred during otolaryngologic procedures. In over 1,750 foreign body cases that have come to this clinic there have been fourteen cases due to accidents during otolaryngologic operations. When the enormous number of operations that are performed on the nose and throat every year is considered, it is a great tribute to the careful technic and skill of otolaryngologists that these accidents do not occur more frequently.

CASE 1.—*Lamp from a Whitehead mouth gag in the right bronchus.*

A boy, aged 10, had inspirated the small lamp from a self-illuminated Whitehead mouth gag during tonsillectomy under ether anesthesia, in the dorsal recumbent position. Fever and cough developed the day after the operation, with evidence of obstruction of the right bronchus. Three days after the accident the temperature was 103 F., and physical examination showed complete obstruction of the right lung. Roentgen-ray examination showed the lamp in the right main bronchus, with complete atelectasis of the right lung, the heart and mediastinum being displaced to the right. Forty-eight hours after the bronchoscopic removal through the mouth of the foreign body, the atelectasis had disappeared, and the temperature was normal. Recovery was complete.

CASE 2.—*Catch from a tonsil forceps in the right bronchus.*

A boy, aged 7, inspirated a catch that broke off the tonsil-grasping forceps during tonsillectomy under ether anesthesia, in the dorsal recumbent position. Physical examination gave evidence of a foreign body in the right lung. Roentgen-ray examination showed a portion of the tonsil forceps in the right lower lobe.

Peroral bronchoscopic removal eighteen days after the accident was followed by perfect recovery. The foreign body, being metallic and not completely obstructing the portion of lung in which it lodged, did not give rise to serious pathologic changes during its sojourn.

CASE 3.—*Tonsil snare wire in right bronchus.*

During tonsillectomy under ether anesthesia on a boy, aged 12, the tonsil snare wire broke, and a portion of it disappeared in the pharynx. Inspection of the chest the same day showed a limitation of expansion over the lower lobe of the right lung. Other physical signs of a foreign body were not found. Roentgen-ray examination showed the piece of snare wire, about 2.5 cm. long, in the bronchus of the lower lobe of the right lung. On peroral bronchoscopic removal, evidence of abnormality in the bronchus was not found. The wounds in the tonsil fossae healed normally.

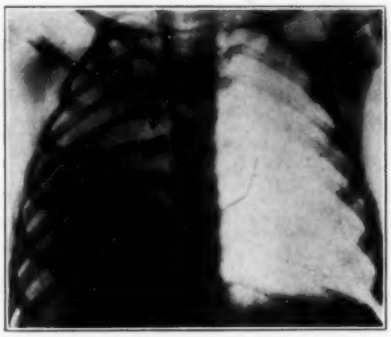


Fig. 1 (case 1).—Lamp from a Whitehead mouth gag in the right main bronchus producing atelectasis of the right lung.

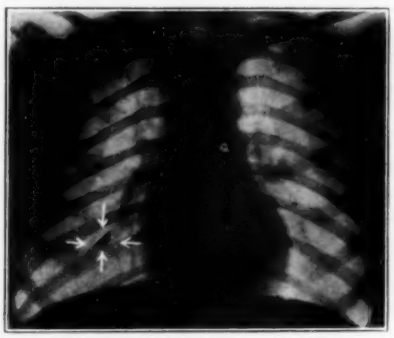


Fig. 2 (case 2).—Catch from a Robertson tonsil forceps in the bronchus of the lower lobe of the right lung.

CASE 4.—*Gold tooth crown in right bronchus.*

A woman, aged 51, had a tonsillectomy performed, under ether anesthesia, in the dorsal recumbent position. A few days later she developed a cough with wheezing respiration. Pulmonary symptoms persisted, and it was thought that she had developed bronchial asthma. For two and a half months she did not respond to treatment. The patient had missed a gold crown from a molar tooth following the operation, and suggested that it might be in her lung and might be the cause of her asthma. In clearing up the possibility of aspiration, roentgen-ray examination showed the gold crown in the right bronchus. On admission the patient's only complaints were a slight cough and a marked asthmatoid wheeze. After peroral bronchoscopic removal the wheeze disappeared immediately, and the cough and asthmatic symptoms ceased.

CASE 5.—*Deciduous tooth in right bronchus.*

A girl, aged 8, who was well prior to tonsillectomy, which was performed under ether anesthesia, in the dorsal recumbent position, developed cough and fever with signs in the right side of the chest on the second day after the operation. Roentgen-ray examination showed the crown of a deciduous tooth in the bronchus to the lower lobe of the right lung. When she was admitted to the hospital, ten days after aspiration of the tooth, she had a slight fever, and there was evidence of retention of secretion in the lower lobe of the right lung. Peroral bronchoscopic removal of the tooth was followed by complete recovery. The patient was discharged from the hospital on the third day after bronchoscopy.

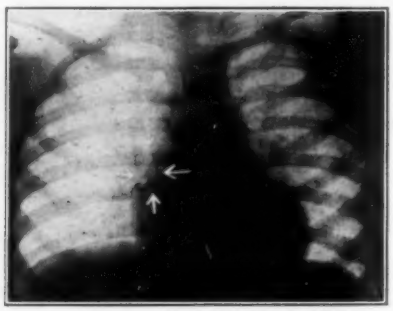


Fig. 3 (case 3).—Portion of tonsil snare wire in right main bronchus.

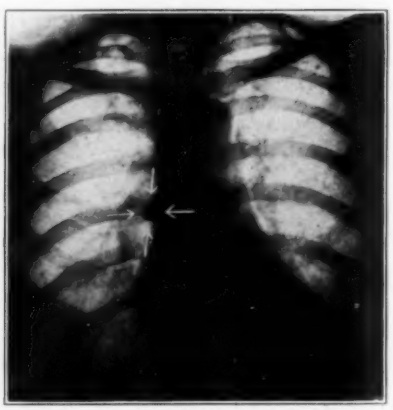


Fig. 4 (case 4).—Gold crown of a tooth in right bronchus.

CASE 6.—*Deciduous tooth in right bronchus.*

Tonsillectomy was performed under ether anesthesia, with the patient, a boy, aged 10, in the dorsal recumbent position. He developed a cough, pain in the right side of the chest and fever immediately after the operation. He went home under the care of the family physician, and it was supposed that he had developed pneumonia. When the symptoms did not clear up at the end of three weeks, the otolaryngologist insisted on a roentgen-ray examination of the chest. The crown of a small deciduous tooth was found in the right bronchus, with evidence of retained exudate in the middle and lower lobes of the lung. On admission to the clinic, the child had an irregular fever and was toxic. Peroral bronchoscopic removal of the tooth by Dr. L. H. Clerf was followed by complete recovery, and the child left the hospital on the third day after the bronchoscopy.

CASE 7.—*Deciduous tooth in left bronchus.*

A boy, aged 8, two days after tonsillectomy under general anesthesia, with the child in the dorsal recumbent position, developed irregular fever, with a cough and expectoration. Five teeth had been extracted at the time of the tonsillectomy, but these were accounted for by the operator. Roentgen-ray examination eight days after the tonsillectomy showed a deciduous tooth in the left bronchus. The tooth had been loosened by the mouth gag. On physical examination Dr. McCrae reported that there was evidence of blocking of the left bronchus, with some atelectasis and retention of secretion in the left lung and a marked limitation of expansion on the left side. Peroral bronchoscopic

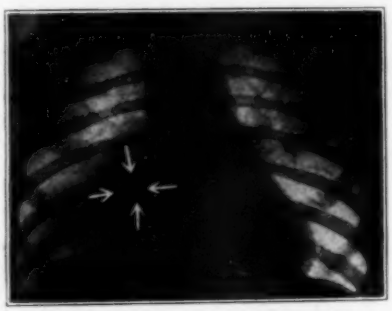


Fig. 5 (case 5).—Deciduous tooth in the right bronchus.

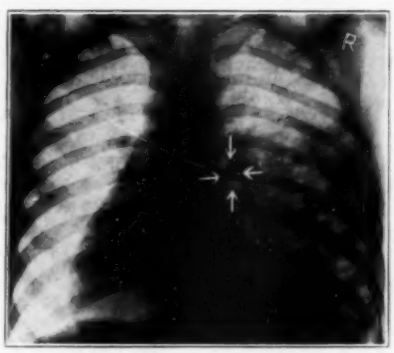


Fig. 6 (case 6).—Deciduous tooth in the right bronchus.

removal by Dr. Clerf was followed by prompt recovery, the child being discharged from the hospital the fourth day after bronchoscopy.

CASE 8.—*Deciduous tooth in right bronchus.*

A boy, aged 11, on whom tonsillectomy was performed under ether anesthesia in the dorsal recumbent position, developed an irritative cough and wheezing respiration twenty-four hours after the operation. He was discharged from the hospital and came under the care of the family physician, who thought that he had caught cold and that his symptoms were due to enlarged mediastinal glands. His cough was unproductive. He was kept under observation for two weeks. The otolaryngologist finally succeeded in having a roentgen-ray examination made of the chest, which revealed an opaque foreign body in the right main bronchus. The internist had felt that the roentgen-ray examination was not necessary. On his admission to the clinic, the child did not appear ill, but the wheeze and nonproductive cough persisted. Physical examination by Dr. Perry Pepper localized

a foreign body in the right main bronchus, and showed emphysema of the right lung, with displacement of the heart to the left. Roentgen-ray examination by Dr. Pancoast showed a foreign body, the shape of the crown of a deciduous molar, in the right main bronchus. On bronchoscopic examination it was found that the tooth was in such a position at the orifice of the bronchus to the upper lobe of the right lung, and was so surrounded by granulations as to allow admission of air to the right lung on inspiration and to prevent its escape on expiration. This accounted for the unusual picture, for this type of foreign body, of obstructive emphysema in the portion of lung distal to the foreign body. After peroral bronchoscopic removal, recovery was complete. The patient was discharged two days after bronchoscopy.

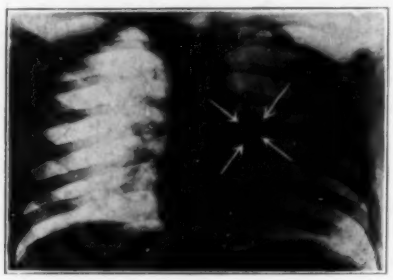


Fig. 7 (case 7).—Deciduous tooth in the left bronchus.

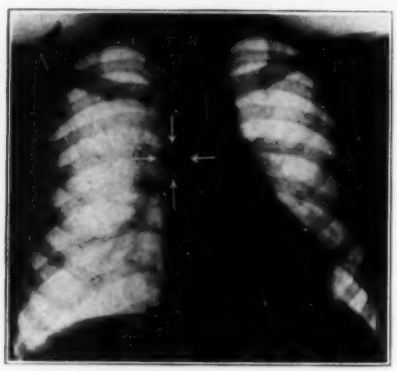


Fig. 8 (case 8).—Deciduous tooth in the right bronchus producing obstructive emphysema of the right lung.

CASE 9.—*Deciduous tooth in right bronchus.*

A girl, aged 9, was admitted to the clinic one month after tonsillectomy under ether anesthesia. Following the operation she developed a dry, unproductive cough. She noticed that a tooth had been lost, and it was not found. Roentgen-ray examination was not made at that time. The child was sent home, and the cough continued. She developed fever and lost weight. Three weeks after tonsillectomy the cough became productive, the sputum consisting of foul, blood-stained pus. Roentgen-ray examination was then made, and revealed a deciduous tooth in the right stem bronchus. The tooth was removed bronchoscopically without anesthesia. The patient made a complete recovery.

CASE 10.—*Tonsil sponge in the left bronchus.*

A man, aged 44, was operated on under local anesthesia, while in the upright position. A turbinotomy and submucous resection of the septum were performed, and the nose packed. The left tonsil was then removed, and a gauze sponge saturated with 10 per cent cocaine was packed in the tonsil fossae. The right tonsil was being injected when the patient gagged, choked and inspirated the sponge from the fossa. The right tonsil was removed. The chest was exam-

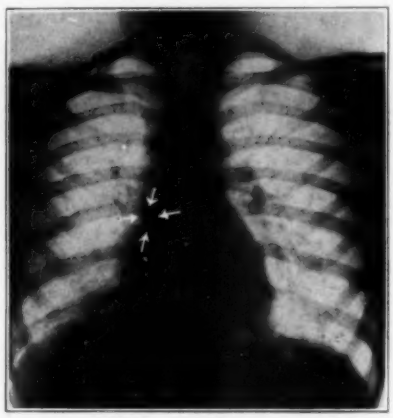


Fig. 9 (case 9).—Deciduous tooth in the right bronchus.

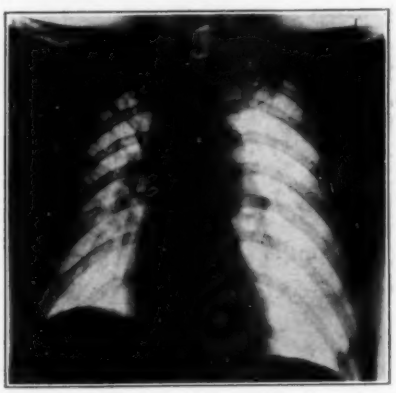


Fig. 10 (case 10).—Tonsil sponge in the left bronchus, showing obstructive emphysema of the left lung, with displacement of the heart toward the right on expiration.

ined, and it was found that air did not enter or leave the left lung. The bronchoscopist was called in consultation, and on physical examination we found the left bronchus completely blocked. Roentgen-ray examination confirmed this observation. Peroral bronchoscopic examination showed that the left bronchus was blocked by a blood clot and the tonsil sponge. The blood clot and tonsil sponge were removed and the tracheobronchial tree was found normal. The man made an uneventful recovery from the nasal and tonsil operation.

CASE 11.—*Portion of nasal rasp in left bronchus.*

During a frontal sinus operation under general anesthesia, a man, aged 45, in the dorsal recumbent position, inspirated a portion of a rasp which was broken while it was being used to enlarge the opening in the frontal sinus. In order to locate the missing portion of the instrument, a roentgen-ray examination was made the following day. It showed a portion of a Brawley's rasp, three fourths of an inch (1.9 cm.) long, in the left bronchus. The only sign of a foreign body was Dr. McCrae's sign of limitation of expansion on the invaded side.

Fig. 11 (case 11).—Portion of nasal rasp in left bronchus.

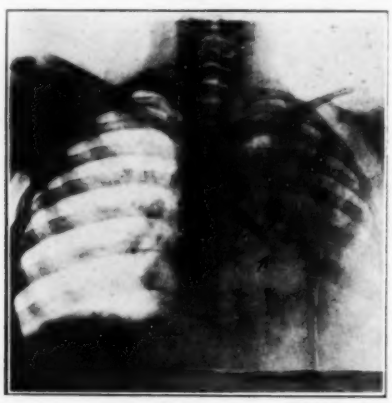


Fig. 12 (case 12).—Intubation tube in the left bronchus. It had been in position a year and a half, and the child had developed an abscess caused by a foreign body.

Recovery was uneventful after bronchoscopic removal of the foreign body. The expansion of the left side of the chest became normal.

CASE 12.—*Intubation tube in left bronchus.*

A boy, aged 7, was admitted to the hospital with a diagnosis of abscess of the lung. Roentgen-ray examination showed a pathologic area in the left lung surrounding a shadow of an intubation tube. The history elicited was that eighteen months before the child had had laryngeal diphtheria, and that during intubation a tube had been lost. It was supposed to have been swallowed and later

passed in stool. The child had developed pulmonary symptoms within a month after recovery from diphtheria. The symptoms had continued up to the time of his admission to the hospital. The tube was of the O'Dwyer type, the no. 1 size, and had been used in a 6-year old child. This accounted for the fact that the tube passed through the glottis. If a tube of the proper size had been used, the accident could not have happened. The foreign body was removed bronchoscopically without anesthesia, and the patient recovered completely.

CASE 13.—*Wooden applicator and swab in right bronchus.*

A girl, aged 22 months, developed an attack of acute follicular tonsillitis. After she had been ill several days, the father, who is a physician, attempted to take a culture from the throat with a wooden applicator. The stick broke, and the child inspirated the cotton-wrapped end of the stick. She had not had anesthesia, and was in the upright position. Roentgen-ray examination made by the father the next day showed atelectasis of the right lung. The child was brought to the clinic five days after the inspiration of the swab. On admission the patient was markedly dyspneic, and Dr. McCrae, on examination, expressed his belief that the foreign body was in the right bronchus and trachea. Roentgen-

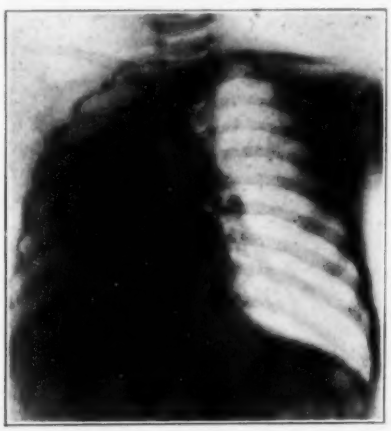


Fig. 13 (case 13).—Wooden applicator and cotton swab in the right main bronchus producing obstructive atelectasis of the entire right lung, with displacement of the heart and mediastinal structures into the right side of the chest.

ray examination by Dr. Manges showed an atelectasis of the right lung, with evidence of a foreign body in the trachea. On peroral bronchoscopic examination, a large quantity of foul pus was found and aspirated from the trachea; the swab was found in the right main bronchus with the stick projecting into the trachea. After removal of the swab, convalescence was prolonged. It was necessary to aspirate the secretions bronchoscopically at frequent intervals. The child was discharged well at the end of three weeks.

The violent inflammatory reaction in this case was due, I believe, first, to the nature of the foreign body, cotton being a vegetal substance; and second, to a virulent growth of Friedländer bacillus shown by a culture from the tracheal secretion.

CASE 14.—*Radium capsule in the stomach.*

A boy, aged 13, had an operation for sarcoma of the antrum, followed by application of radium. Two radium containers covered with a finger cot were placed in the antrum, fastened by a string, and at the time for the removal, the radium was missing. Roentgen-ray examination showed it to be in

the boy's stomach. The radium capsules were removed by gastroscopy with double-plane fluoroscopic aid. Untoward effects were not felt from the sojourn of the radium in the stomach or from the gastroscopy.

POSTOPERATIVE PULMONARY INFECTION

There is another group of cases in which there is a postoperative pulmonary infection, a large percentage of which follow operations on the nose, throat and mouth. I shall present briefly four cases illustrative of the value of peroral endoscopy in their diagnosis and treatment.

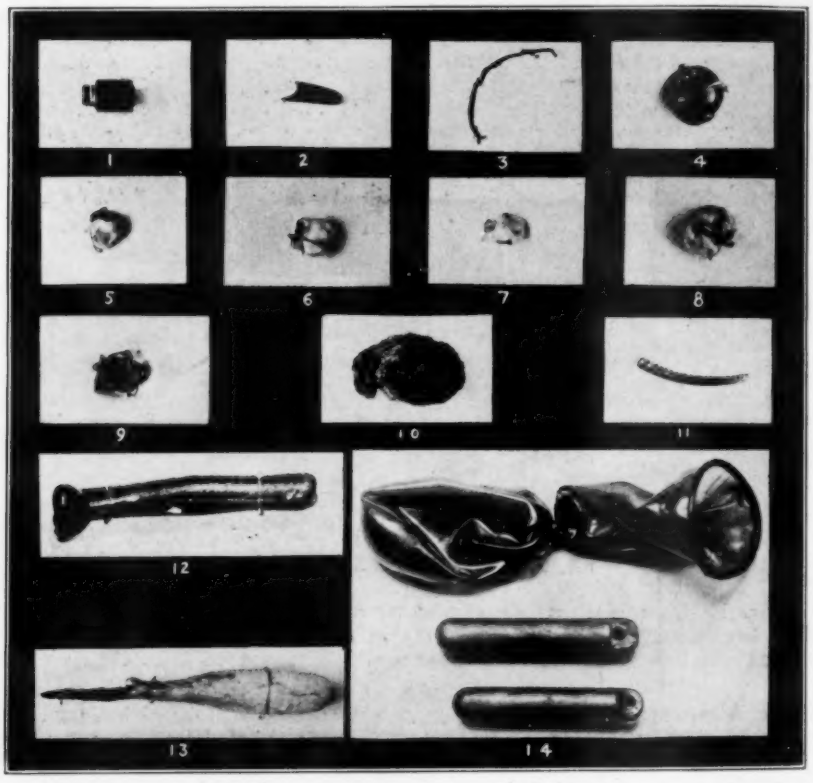
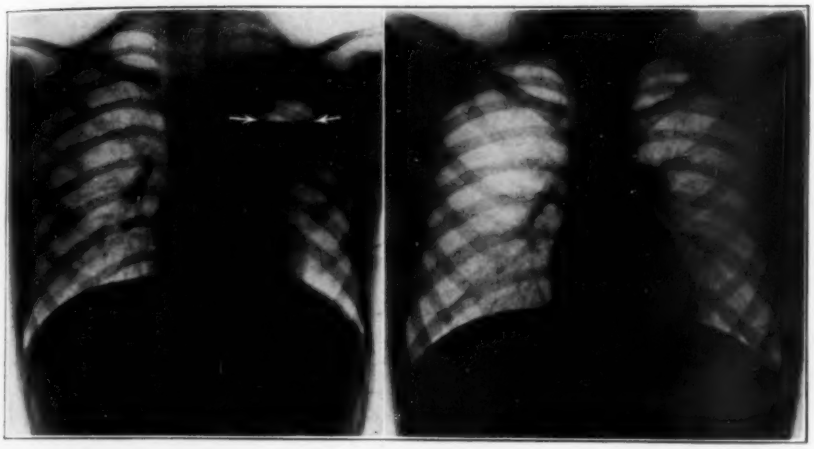
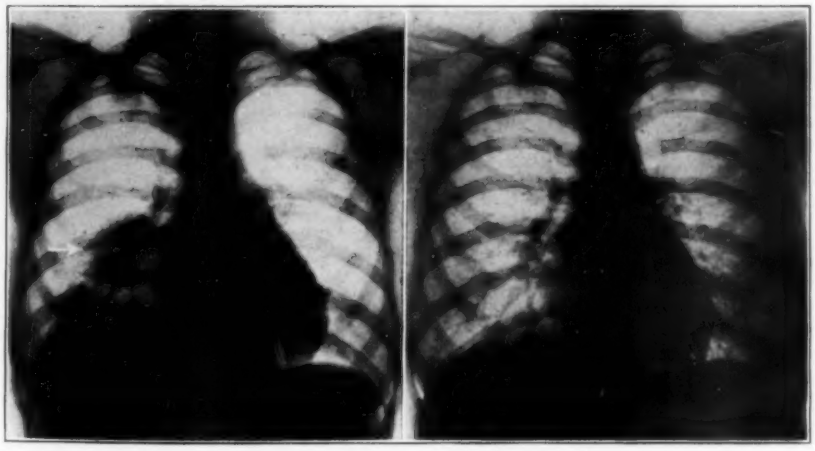


Fig. 14.—Foreign bodies inspirated during otolaryngologic operations and removed bronchoscopically: *1*, Whitehead mouth gag lamp removed from right main bronchus; *2*, catch from tonsil forceps removed from bronchus of the right lower lobe; *3*, tonsil snare wire removed from the right main bronchus; *4*, gold tooth crown removed from the right main bronchus; *5*, deciduous tooth removed from the right bronchus; *6*, deciduous tooth removed from the right bronchus; *7*, deciduous tooth removed from the left bronchus; *8*, deciduous tooth removed from the right main bronchus; *9*, deciduous tooth removed from the bronchus of the right lower lobe; *10*, tonsil sponge removed from the left main bronchus; *11*, portion of nasal rasp inspirated during frontal sinus operation—removed from the bronchus of the left lower lobe; *12*, intubation tube inspirated during intubation—removed from the left main bronchus; *13*, wooden applicator and swab inspirated during the taking of a specimen for culture from the throat—removed from the right main bronchus; *14*, radium capsule dislodged from the antrum, and swallowed—removed by gastroscopy from the stomach.



A B

Fig. 15 (case 1).—*A*, post-tonsillectomy abscess of the left upper lobe showing fluid level; after seven bronchoscopic aspirations at weekly intervals the patient was cured; *B*, film two and a half years after bronchoscopic cure showing normal shadows of the chest. (Roentgenograms by Dr. Pancoast.)



A B

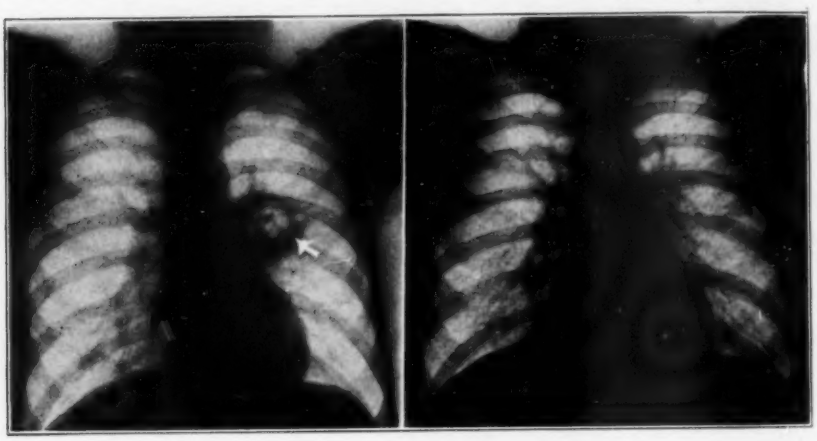
Fig. 16 (case 3).—*A*, post-tonsillectomy pulmonary abscess involving right lower and middle lobes; *B*, same patient after bronchoscopic cure; patient was symptomatically well and had gained 20 pounds (9 Kg.) in weight. (Roentgenograms by Dr. Pancoast.)

CASE 1.—*Post-tonsillectomy pulmonary abscess.*

A boy, aged, 7, was referred to the clinic ten days after tonsillectomy. The pulmonary symptoms had come on five days after the operation. On admission there was involvement of the upper lobe of the left lung. Roentgen-ray examination showed a large cavity with a fluid level in this lobe. The patient was treated bronchoscopically at weekly intervals, and after seven treatments was discharged well. Roentgen-ray examination showed the lungs to be clear.

CASE 2.—*Post-tonsillectomic pulmonary abscess.*

A man, aged 26, developed a post-tonsillectomic pulmonary abscess one week after operation. He was admitted to the clinic three weeks after the onset of pulmonary symptoms. The abscess was found in the left lung posteriorly at the level of the lower border of the scapula. Bronchoscopically, it was determined that the abscess was in the lower portion of the upper lobe and not in the upper portion of the lower lobe. The location of the abscess was unfavorable for bronchoscopic treatment. He was referred to Dr. George P. Muller, who performed a thoracotomy and drained the abscess. The man made a complete recovery.



A B

Fig. 17 (case 17).—*A*, post-tonsillectomy pulmonary abscess of the left lower lobe; *B*, same patient after bronchoscopic cure.

CASE 3.—*Post-tonsillectomic pulmonary abscess.*

A woman, aged 30, was admitted to the University Hospital one month following a tonsillectomy, with an infective process involving the middle and lower lobes of her right lung. Under bronchoscopic treatment at weekly intervals the infective condition cleared up, and the patient was discharged well aften ten treatments. After six months she had gained 30 pounds (13.6 Kg.) in weight and was entirely well.

CASE 4.—*Post-tonsillectomic pulmonary abscess.*

A man, aged 25, five days following tonsillectomy developed a pain in the left side of the chest. Blood-stained purulent expectoration followed, and one week after his operation, he was admitted to the bronchoscopic clinic for treatment. Roentgen-ray and physical examinations showed involvement of the lower lobe of his left lung. On bronchoscopic examination the posterior division of the left lower bronchus was found inflamed and obstructed by blood-stained pus. The secretion was aspirated, and local medication was applied. Treatment was repeated at four-day intervals, and after eight treatments the bronchus to the lower lobe was normal. The man was symptomatically well; he had gained 10 pounds (4.5 Kg.) in weight, and the bronchoscopic instillation of iodized oil 40 per cent into the area of the lung that had shown an abscess cavity gave graphic proof that the cavity had disappeared.

CONCLUSIONS

In the first two cases of this group, I believe the infection occurred through the embolic route, and in the last two, the infection was probably inspiratory in origin. These cases illustrate the value of endoscopic procedure in this type of postoperative complication.

It is peculiar that of these fourteen cases of foreign body accident, occurring during otolaryngologic operations, and referred to the clinic over a period of ten years, eleven were referred during the past year. Is this sudden increase in the number of such cases due to a real increase in the number of these accidents or to the awakened interest of the medical profession in the presence of foreign bodies as a cause of postoperative pulmonary complications? I feel that the apparent increase is due to the recognition by physicians of the true nature of the complication, and that probably during the past many cases were overlooked.

The enormous demand for careful and safe bronschoscopy for the diagnosis and treatment of pulmonary disease is making serious inroads on the time of the otolaryngologist. There seems to be an increasing need in the large hospitals of the great medical centers for a fully equipped bronchoscopic clinic prepared to render safe assistance in the diagnosis and treatment of diseases of the lungs, esophagus and stomach. The logical man for this work is the otolaryngologist, if he has the time.

VISUALIZATION OF THE EUSTACHIAN TUBE BY THE ROENTGEN RAY

PRELIMINARY REPORT *

WILLIAM SPIELBERG, M.D.
NEW YORK

The important rôle played by the eustachian tube in its relation to the normal and pathologic middle and internal ear has been a subject of intense interest and study to the otolaryngologist.

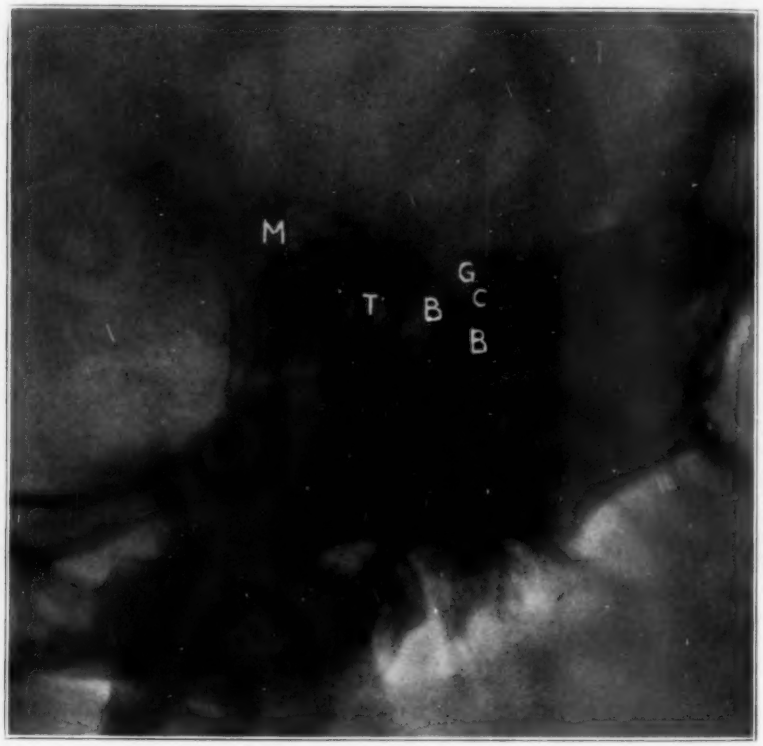


Fig. 1.—Moderately advanced sclerotic changes in the mastoid, involving also the bony portion of the eustachian tube, as shown in a young boy suffering with chronic suppuration of the middle ear and deafness; the tube has not been filled with iodized oil; *M* indicates the mastoid; *T*, tympanic cavity; *B*, bony portion of eustachian tube; *G*, glenoid fossa; *C*, condyle of the mandible.

Although the anatomy, physiology and pathology of the eustachian tube are apparently well known, there are many problems concerning the pathology which remain unsolved. For instance, little is known concerning the variety, character and location of the stenoses or strictures

* From the Otolaryngological Department, Beth Israel Hospital.

of the eustachian tube and the relation they bear to diseases of the ear in general and to tinnitus and deafness in particular. A method is lacking also for appraising definitely the effects of tubal dilatation as it is applied today in the treatment of the stenoses of the eustachian tube.

There are several points of academic interest concerning the anatomy of the eustachian tube which have not satisfactorily been described, for example, the dimensions of its various parts, and the relation they bear

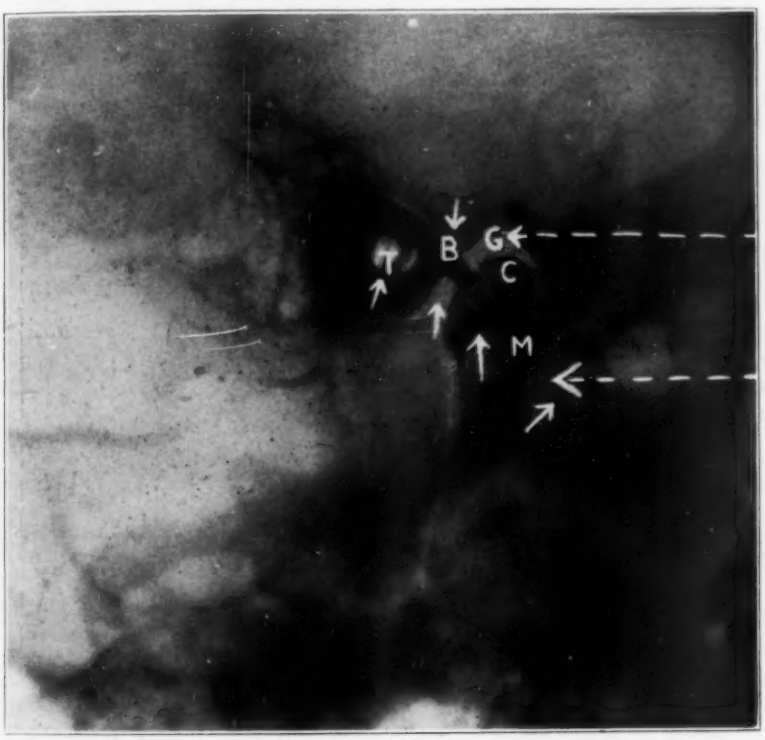


Fig. 2.—Eustachian tube filled with iodized oil; *T* indicates the tympanic cavity; *B*, bony portion of eustachian tube; *M*, membranous portion of eustachian tube; *G*, glenoid fossa; *C*, condyle of the mandible. The bony canal can be seen arising from the upper portion of the tympanic cavity, crossing the glenoid fossa between the anterior wall of the external auditory meatus and the condyle of the mandible, crossing the condyle and continuing as the membranous portion to the pharynx.

to one another; the shape and course it assumes in the living, and the location and relation to one another of the tympanic and pharyngeal openings.

Were it possible to visualize the eustachian tube through its entire course by filling it with an opaque substance and making roentgenograms

of it as one would of any organ of similar tubal structure, it not only would be of academic interest but would also aid in solving some of the problems enumerated above.

After several attempts to secure satisfactory roentgenograms of the eustachian tube of patients taken at random from my private practice, a fairly good roentgenogram was obtained. The technic used was subsequently adopted in making roentgenograms of the eustachian tube in other patients.

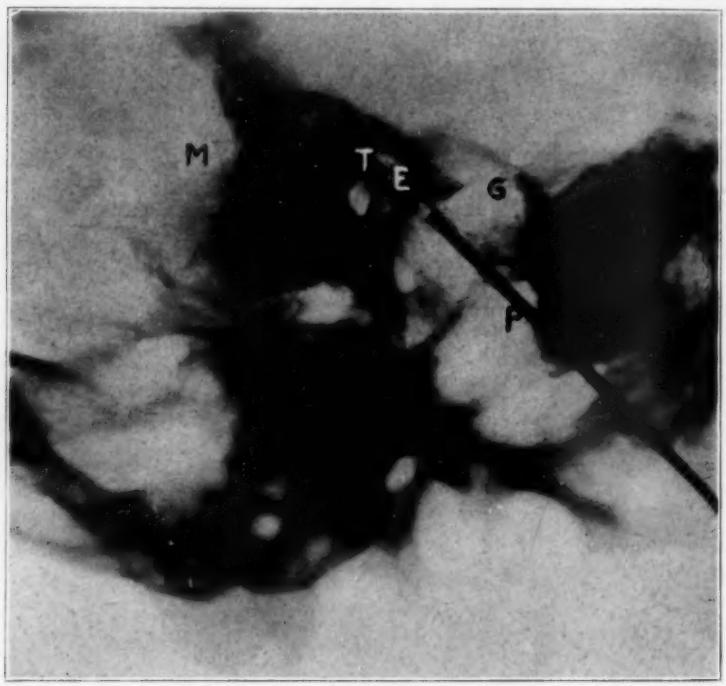


Fig. 3.—Dried bone specimen not injected with iodized oil, showing the bony portion of the eustachian tube and its relation to the tympanic cavity; *M* indicates the mastoid; *T*, tympanic cavity; *E*, bony portion of the eustachian tube; *G*, glenoid fossa; *P*, probe passing into the bony portion of tube.

TECHNIC

After the mouth and pharyngeal end of the eustachian tube has been anesthetized in the usual manner, a no. 4 silk catheter is passed through a pliable silver eustachian catheter into the eustachian tube and inserted about 3 or 4 cm. within the membraneous portion of the tube. The silver catheter thus becomes anchored in one position; from 10 to 15 drops of iodized sesame oil, 40 per cent (iodopin) solution, is then instilled drop by drop into the eustachian tube and blown into it either with a small air pump or with a soft rubber bulb attached to the end of the silk catheter.

The entire procedure can be facilitated by employing my naso-antroscope (Pfau). With experience, one can learn to introduce the catheter into the eustachian tube without the aid of the naso-antroscope. The eustachian tube can also be filled with iodized oil through any metal catheterizing tube, without passing a silk catheter through it. The use of the latter has, however, given better results.

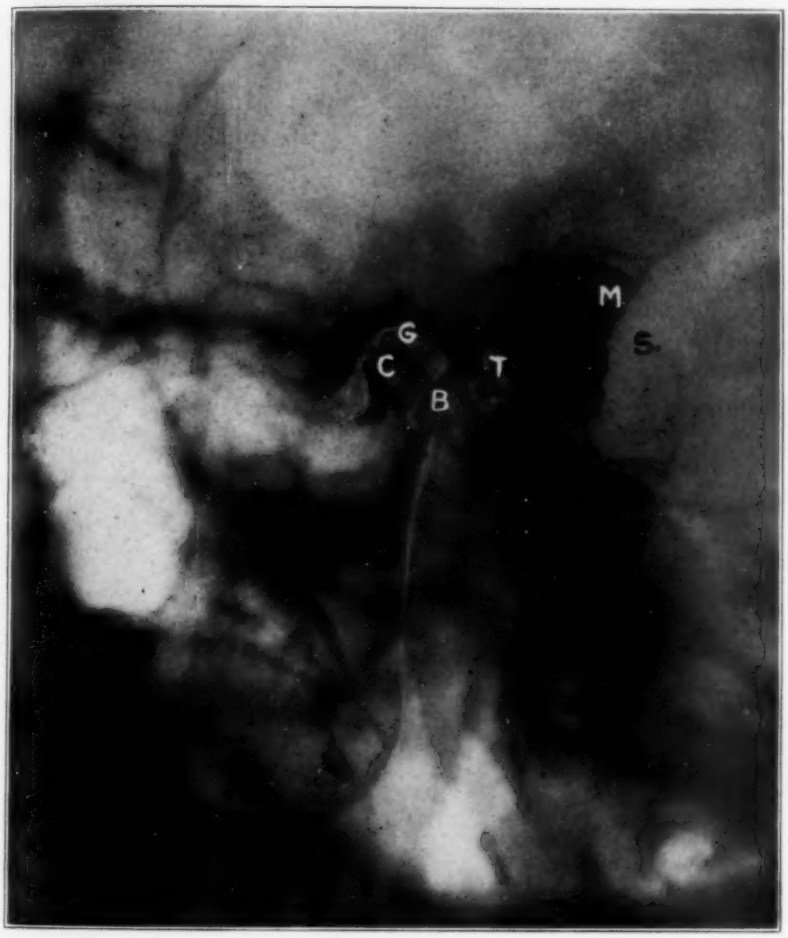


Fig. 4.—Bony canal of eustachian tube filled with iodized oil; its relation to the middle ear, as shown in a young woman suffering with deafness and chronic suppuration of the middle ear, since infancy; *C* indicates the condyle; *G*, glenoid fossa; *T*, tympanic cavity; *B*, bony portion of eustachian tube; *M*, sclerotic mastoid; *S*, lateral sinus.

With the aid of a diagnostic tube, as well as by the sensation of fullness experienced by the patient, the operator can tell the progress of the iodized oil as it fills the eustachian tube.

It was of interest to me while studying the position and course of the eustachian tube on the roentgenograms, to find that in a large percentage of

roentgenograms taken of mastoids it was possible to visualize rather clearly the bony portion of the eustachian tube. This observation was made particularly in cases in which a tubal lesion was associated with both early and advanced sclerosis of the mastoid bone (fig. 1).

Dr. Lewis J. Friedman, to whom I am indebted for the radiographic work done in these experiments, describes his method of making roentgenograms of the eustachian tube, as follows:

"The technic employed in making roentgenograms of the eustachian tubes is essentially the same as that used in the examination of the mastoids. The patient is placed prone with the head turned on the side to be examined on a 15-degree inclined block. The pinna is pulled forward, and the patient's head then rests on the mastoid process. A fine focus tube is used, and a short

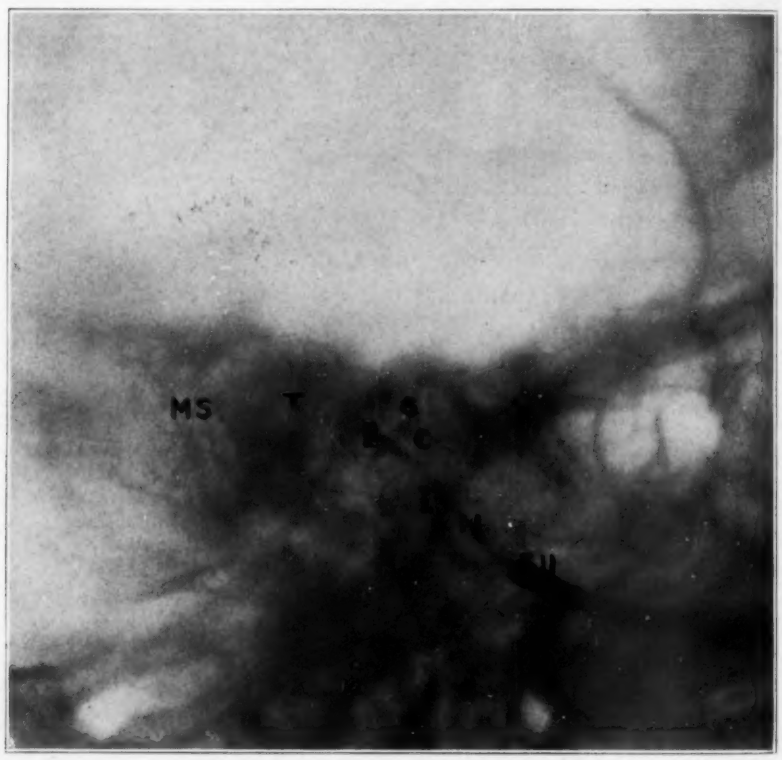


Fig. 5.—Eustachian tube filled with iodized oil which latter fills up the tympanic cavity; the tube shows a constriction at the isthmus. The patient was suffering with chronic catarrhal deafness. *MS* indicates the mastoid bone; *T*, tympanic cavity filled in outline with iodized oil; *B*, bony portion of tube; *G*, glenoid fossa; *C*, condyle of mandible; *M*, membranous portion of tube; *I*, constriction of tube at isthmus; *EU*, eustachian catheter.

cylindrical cone is adjusted to the tube stand. The focal point is found by drawing a line horizontally across the external auditory measure, and then another vertically to this at a point 1½ inches posterior to the external ear. The focal point is located 1½ inches above the horizontal line.

Using a 5-inch back-up, 40 milliamperes, and double intensifying screen, the exposure time is usually about one second at 22 inches distance from tube anode to place surface."

As this is an experimental study, the history, clinical observations and treatment in the cases in which roentgenograms were made will not be discussed. I shall confine myself to a brief report of the results of the experiments.

RESULTS OF EXPERIMENTS

1. By employing a proper technic, roentgenograms can be made of the eustachian tube. The roentgenograms show that the eustachian tube assumes the course of an inverted S, making two curves as it leaves

Fig. 6.—Eustachian catheter in the mouth of the eustachian tube. The latter can be seen filled irregularly with defects in the membranous portion, injected with iodized oil, none of which entered the bony portion of the tube or the tympanic cavity; *Ms* indicates the mastoid bone sclerosed; *T*, tympanic cavity; *G*, glenoid fossa; *M*, membranous portion of tube; *S*, defects in the membranous portion; *EU*, eustachian catheter in the mouth of the tube.

the tympanic cavity arching downward and forward across the space between the anterior canal wall of the bony external auditory meatus and the condyle of the mandible. Crossing the latter, it continues in its course downward for from 15 to 20 mm. and describes another

slight curve downward and forward, terminating as the pharyngeal end in the pharynx (fig. 2).

2. The length of the tube is from 30 to 33 mm. from the mouth to the tympanic end (fig. 2). Its length can be increased by passing a metal filament into the tube, thus putting the membranous portion on a stretch.

3. The tympanic orifice of the eustachian tube is from 2 to 2.5 cm. higher than the pharyngeal end, but in some cases has been found to be only 1 cm. higher (fig. 2). The osseous portion, as well as the tympanic opening, appears as a prolongation of the anterior superior portion of the tympanic cavity (fig. 3). The superior wall of the tympanic cavity merges into the bony portion of the tube (figs. 1, 3 and 4).

4. The bony and membranous portions can easily be differentiated from one another and their course visualized. The bony portion forms one third and the membrano-cartilagenous portion two thirds of the entire length of the eustachian tube. The width of the bony portion was found to vary between 2 and 3 mm., the width of the membranous portion between 1 and 1.5 mm. (figs. 1, 2 and 3).

5. Strictures or stenoses can be distinctly visualized and located (figs. 5 and 6).

6. The iodized oil instilled into the tube was retained only a few minutes. Both the act of swallowing and the action of the celiae cause the rapid evacuation of the foreign matter injected into the tube. This, however, was found not to be the case in patients with dilatated tubes or in those in whom atrophic changes had taken place in the lining epithelium. In one such case the roentgenogram showed the presence of iodized oil one week after the initial injection.

211 Henry Street.

TIC DOULOUREUX OF THE GLOSSO-PHARYNGEAL NERVE

REPORT OF A CASE *

HENRY M. GOODYEAR, M.D.
CINCINNATI

Glossopharyngeal neuralgia is a definite clinical entity which differs from trifacial neuralgia only in the area of distribution of pain.

A man, aged 74, came to the ear, nose and throat service at the Cincinnati General Hospital for the relief of severe pain in the region of the throat. The pain was spasmodic, excruciating and lancinating in character, suggesting trifacial neuralgia. However, I was particularly interested in the location of the pain, which did not correspond to the usual course of the fifth nerve.

Fig. 1.—Area of distribution of pain.

In reviewing the literature, I found that sixteen cases of tic disturbances of the ninth nerve had been reported. On closer examination, it was evident that the case of my patient was of this type.

The point of greatest pain was slightly above and lateral to the hyoid bone, radiating backward below the angle of the maxillary ramus and anterior to the ear (fig. 1). There had not been any pain in the ear. The attacks were brought on by talking and by swallowing, but not by chewing. I found that the trigger zone seemed to be most distinct at the junction of the lower and middle third of the posterior tonsillar pillar (fig. 2).

Glossopharyngeal neuralgia is frequently mistaken for neuralgia of the fifth nerve. Anatomically, fibers of the fifth and ninth nerve intermingle, and it is possible that in the irritation of one, the pain may be transmitted to the distribution of the other. Weisenburg describes a case of cerebellopontile tumor with marked pressure on the ninth nerve which was diagnosed for six years as a tic douloureux of the fifth nerve.

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* Read before the Cincinnati Ear, Nose and Throat Society, Jan. 11, 1927.

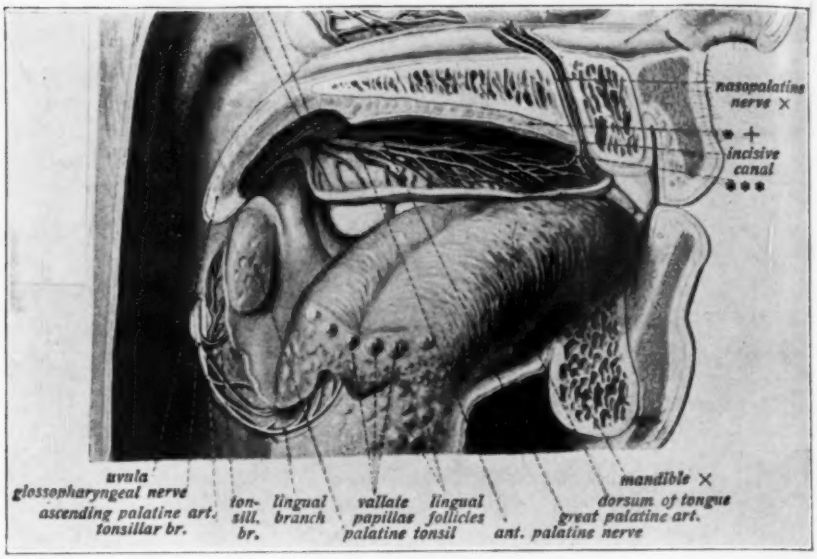

Fig. 2.—Exposure of glossopharyngeal nerve in the region of the posterior pillar of the tonsil and the base of the tongue. (SoBotta.)

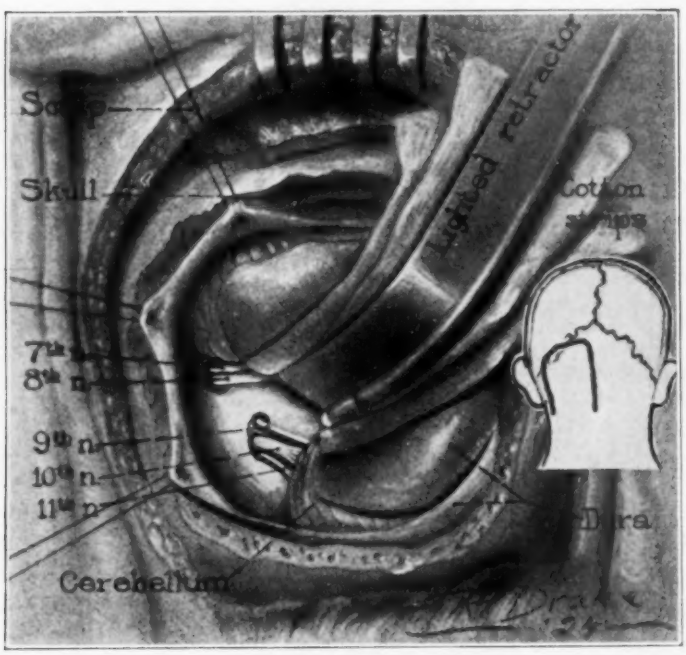

Fig. 3.—Exposure of the seventh, eighth, ninth, tenth and eleventh cranial nerves at the point of exit from the skull, preliminary to the division of the glossopharyngeal nerve. (After Adson.)

The diagnosis does not seem so difficult if one thinks only of the possibility of a glossopharyngeal neuralgia. In several of the reported cases the condition was mistaken for neuralgia of the third branch of the fifth nerve, and injections of alcohol had been given or operation had been performed on the gasserian ganglion. The error was disclosed by the loss of sensation in the fifth nerve and a persistence of the neuralgia in the distribution of the ninth.

Adson of the Mayo Clinic has avulsed the nerve by approaching it extracranially by a neck dissection. However, since the ganglion lies high up in the jugular foramen, Adson suggests that the root be reached by an intracranial route through the lateral occipital region. In a personal communication, he says that since making the suggestion he has successfully used this method of approach (fig. 3). The dura is incised and the cerebellum elevated toward the jugular foramen, where the seventh, tenth and eleventh nerves can easily be seen passing out through the jugular foramen. The ninth nerve is cut at this point.

556 Doctors' Building.

TIC DOULOUREUX CURED BY MASTOIDECTOMY

REPORT OF A CASE *

HENRY S. WIEDER, M.D.

PHILADELPHIA

History.—O. B., a woman, aged 38, married, childless, twelve years before I saw her had suffered from an attack of otitis media of the right ear, accompanied by discharge, the duration of which she did not know. From the first attack until operation in January, 1924, the patient complained of tenderness over the right mastoid to such an extent that she was never able to lie on her right side to sleep, waking if she turned over. She was never able to wear tight fitting hats or to use the telephone with her right ear.

Five years later she moved into a damp suburb of Boston and drove in an open automobile. Shortly afterward she developed pain on the right side of her face. It began in the lower jaw. It was always present on damp days, and a sharp wind precipitated a violent attack. Two years after the onset of the facial pain she consulted a prominent oral surgeon, who diagnosed her condition as calcification of the nerves of the lower incisors. The nerves in question were removed, leaving the teeth sensitive. She then moved to Philadelphia. There she again consulted an oral surgeon, who injected the mandibular nerve twice, once at the mental foramen and once at the mandibular foramen. The last injection was followed by swelling and some stiffness of the face for six weeks. The pain did not leave entirely, however, until an infected tooth was removed.

After leaving the lower jaw, the pain appeared in the cheek and in the supraorbital region. It was accompanied by a drooping of the right upper eyelid and a feeling of stiffness during the attacks, which continued to appear when she was exposed to dampness and wind. They lasted from one to three days. She then consulted another physician in Boston, who advised removal of the gasserian ganglion, referring her to a leading Philadelphia surgeon. Had there not been some difficulty about the arrangements, she might now be minus the ganglion. She determined to do nothing further about it, but to endeavor to endure the pain. A year previous to calling on me she had an attack of what was apparently acute catarrhal otitis media, which was treated by her physician with complete success, as she obtained relief from all the symptoms in her ear except the tenderness over the mastoid, to which she was accustomed.

On Sept. 27, 1923, the patient began to have itching in the right external auditory canal followed by a pain in the ear and on touching the auricle. She was treated by another aurist until October 18, when she was referred to me. At the time of her first visit she complained merely of a roaring and of a sense of fulness in her ear.

Examination.—Examination of the right ear showed acute congestion and dullness of the tympanic membrane with redness of the long handle of the malleus. The external canal was somewhat congested and tender. The left ear appeared normal. The nose showed a deflection of the septum high up on the right and low down on the left. There was no discharge, and transillumination did not reveal any abnormal condition. The nasopharynx was red and congested, but there was no secretion. The tonsils were of moderate size with large crypts, which at the time of examination did not contain débris; however, they frequently contained débris, which the patient herself expressed.

After several weeks of treatment, the subjective and objective signs in the ear disappeared, with the exception of the tenderness over the right mastoid and the tendency of the facial neuralgia to recur oftener and to be more severe. A roentgenogram of the affected mastoid showed what appeared to be a

* Read before the Philadelphia Laryngological Society.

definite area of absorption over the lateral sinus at the site of the local tenderness. The other mastoid did not show such an area. The blood count was not indicative of infection. It was as follows: Erythrocytes, 3,990,000; leukocytes, 7,600; polymorphonuclear leukocytes, 69 per cent; small lymphocytes, 7 per cent; large lymphocytes, 19 per cent; transitionals, 4 per cent; eosinophils, 1 per cent; hemoglobin, 82 per cent; color index, 1 plus. Cocainization of Meckel's ganglion gave slight relief from the neuralgia and did not affect the tenderness over the mastoid. I decided to perform an exploratory mastoidectomy in an effort to relieve the tenderness over the mastoid and possibly also the facial pain.

Operation and Course.—Accordingly, on Jan. 9, 1924, a simple mastoidectomy was performed at the Polyclinic Hospital, Dr. Walter Roberts and Dr. Young assisting. The lateral sinus was exposed, and the area that appeared as an area of absorption in the roentgenogram proved to be a large space without contents, lined with thin epithelium overlying and behind the lateral sinus. The walls of this space were smooth, and it resembled a large cell, but whether it was purely developmental it is impossible to state. The remainder of the mastoid was rather diploic in type, without any pathologic appearance, with the possible exception of a moderate congestion of all the bone. The wound was sutured above, and the cavity was drained. The patient left the hospital in eight days, and was discharged from care with the wound entirely healed within three weeks.

Since the operation, which was performed three years ago, the patient has never had a recurrence of the pain in any branch of the fifth nerve, and does not feel any tenderness over the mastoid, so that she can sleep on her right side for the first time in twelve years, can wear tight hats and can use the telephone with the right ear in a normal manner. She has tested herself by riding in a high wind in an open automobile, and has gone through numerous storms without the slightest discomfort. She never has any further drooping of the right upper eyelid, and so noticeable was the change that it was remarked by some of her friends who did not know that she had had an operation. Her hearing is about the same as before the operation, being slightly subnormal in the right ear, and she still suffers from a slight roaring when she has a cold in her head, but it is transitory.

COMMENT

This case is of unusual interest from a number of different aspects. It is unique in the evident relation of tic douloureux to the condition in the ear. It has always been known that tic douloureux is frequently related to disease of the nose or throat within the distribution of the various branches of the fifth nerve, but as far as I know, only three cases are on record in which it was dependent on a condition within the ear, especially one in which so slight a pathologic condition was found at the time of operation. A number of articles have appeared which call attention to the association of generalized, frontal and occipital headaches with conditions of the ear, but none of the cases was similar to the one here presented. That the condition here reported may be much more frequent than is usually believed can be suspected from the close connection between the gasserian ganglion and the ear, as pointed

out by Lyon [1] of the Mayo Clinic. He has reported four cases of otitis media, which were apparently of trophic origin following section of the sensory root of the gasserian ganglion. They did not act like bacterial infections, but were more like trophic conditions of the tympanic mucous membrane, and the patients underwent spontaneous recovery.

There are two possible explanations of the symptoms manifested by the fifth nerve in this case. One is that they were due to direct disturbance with the function of the trunk of the nerve through interference with its circulation as it passes over the apex of the petrous portion of the temporal bone, thereby affecting the gasserian ganglion. A similar condition is frequently observed in the case of the sixth nerve in Gradenigo's syndrome. This is the generally accepted explanation for these types of irritation involving the gasserian ganglion, the sixth and ninth nerves, and other parts, namely, a localized meningitis at the apex of the petrous bone or at least a marked congestion with the presence of toxins. In such cases, however, the pathologic condition is more pronounced, and the cases are of shorter duration than in my case. In addition, it is hard to believe that the third nerve would be involved, as evidenced by the drooping of the eyelid, and the sixth nerve escape. This explanation probably accounts for Spiro's [2] case, in which the patient suffered from involvement of the sixth nerve, possibly also of the ninth and of the fifth nerves, because of mastoiditis which was latent for a long period. This case showed a marked pathologic condition at operation. It also is a probable explanation of Danforth's [3] case, in which there was involvement of the fifth, ninth, and tenth nerves, but in this case mastoiditis was not demonstrated. There was merely an infiltrated, bulging, moderately red, tympanic membrane.

The other explanation is that the symptoms were due to reflex peripheral irritation of a stimulus such as is obtained by irritation of the auricular branch of the tenth nerve (Arnold's) by tickling the external auditory canal. Coughing is produced to get rid of the irritant, presumably in the larynx. Another striking manifestation of the same phenomena is the frequent production of asthma by ethmoidal or other irritation. Allen's [4] case unquestionably belongs to this type. His

1. Lyon, H. R.: Otitis Media Complicating Operation on the Gasserian Ganglion, J. A. M. A. **80**:176, (Jan. 20) 1923.

2. Spiro, R.: Ueber eine unter dem Bilde einer Trigeminusneuralgia latent verlaufende central Ostitis Processus Mastoidei, Wien. klin. Rundschau, **11**:269, 1897.

3. Danforth, L. L.: J. Ophth., Otol. & Laryngol. **17**:446, 1911.

4. Allen, A. P.: Facial Neuralgia Due to a Hair Irritating the Membrana Tympani, Brit. M. J. **1**:395, 1901.

patient, a young man, had lancinating pains in the infra-orbital branch of the fifth nerve which occurred at intervals and lasted about ten minutes over a period of three months, when it was discovered that there was a hair lying deep in the canal, irritating the tympanic membrane. On removal of the hair, the facial pain was relieved immediately and permanently.

The latter explanation appears to me to be worthy of consideration in the present case, because of the absence of a gross pathologic condition in the mastoid sufficient to explain involvement as deep as the apex of the petrous bone, and especially because of the duration of the condition and the localized tenderness of apparently neuritic origin, without a marked pathologic condition in the bone. The whole question of facial involvement in this case could more easily have been traced to the teeth and to the inflammation following the injections of alcohol, were it not for the fact that all facial symptoms were so completely relieved by the mastoidectomy.

The primary involvement of the mandibular branch of the trifacial nerve probably could be explained by the inflammation in the ear. This inflammation may have caused an irritation of the recurrent branch of this nerve which is distributed to the mucous membranes of the mastoid cells, and of the auriculotemporal branch of the same division of the fifth nerve, which supplies the tympanic membrane. The otic ganglion may also have been irritated through its connection with the auriculotemporal nerve and with the chorda tympani branch of the seventh nerve, which also crosses the tympanic cavity. Disturbance of the geniculate ganglion of the seventh nerve situated in the fallopian canal may have helped to aggravate the symptoms by indirect irritation to Meckel's ganglion through the Vidian nerve, the great superficial petrosal branch of which is derived from the geniculate ganglion.

This explanation is somewhat complicated by the drooping of the eyelid. I have never seen this myself, but it was described by the patient as present during attacks. It is not a manifestation of the fifth nerve, but is caused by a filament of the third nerve. According to this method of reasoning, the only route for involvement of the oculomotor fibers is by means of fibers arising from the third nucleus which descend in the posterior longitudinal bundle and join the facial fibers in which they pass to the upper part of the orbicularis palpebrarum. These fibers may be more sensitive to irritation than the facial fibers, so that irritation of the facial nerve may have given manifestation in only these fibers. This pathway was described by Mendel and is mentioned by

Morris,[5] Obersteiner,[6] and Oppenheim,[7] but is not generally accepted by neurologists.

The case is unusual in the matter of roentgen-ray studies, for it is rather rare to find one mastoid so radically different from the other except in a pathologic condition. Again it is unusual, in that the pathologic condition was so little in evidence and that the operation was so effectual in relieving all symptoms.

2106 Spruce Street.

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5. Morris: Textbook of Human Anatomy, Philadelphia, P. Blakiston's Son & Company, 1902.

6. Obersteiner, H.: Anleitung bein Stadium des Baues der nervösen Zentralorgane in gesunden und kranken Zustande ed. 5, Leipzig, Deuticke, 1912.

7. Mayer, in Oppenheim: Diseases of the Nervous System, ed. 2, Philadelphia, J. B. Lippincott Company.

PEMPHIGUS OF THE THROAT

A SUPPLEMENTARY REPORT

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In a previous discussion on pemphigus of the throat by Dr. MacGruer and me,[1] a case report was given which showed the perplexing symptoms and the rapid course in the acute stage of this disease. Since that time I have had a second case which closely resembles the first. As cases of acute pemphigus are still infrequent, the two cases are of enough importance to warrant a review and a comparison of their outstanding factors.

Both patients were men, one, aged 54, the other, aged 39; both were Russian Jews. The first symptoms shown by the patients were lesions in the mouth, developing shortly after the removal of a tooth; the lesions were widely distributed over the lips, gums, pharynx and larynx, although in the second patient the larynx was much more involved. The lesions were ulcerated, irregular, macerated and bleeding, the macerated mucosa giving the appearance of a pseudomembrane. Vincent's organisms were found on repeated smears; blood Wassermann tests were negative. Dermatologic lesions developed in the first patient three weeks after the appearance of lesions in the mouth, while in the second patient they developed in eight weeks. The first patient died in five weeks; the second patient is still alive, but septic. He has periods of remission, but death will probably result from the condition.

A characteristic odor of the breath, which was emphasized in the report of the case of the first patient, was detected on the breath of the second patient, and because of this, the possibility of pemphigus of the throat was suggested on the first day. The breath of both patients had a pungent, raw flesh odor. I have never previously detected this odor in cases of ulcerative lesions of the mouth and pharynx. I cannot say how much importance should be given to this symptom in making a diagnosis, and I do not assert that it is characteristic of pemphigus of the throat.

The organisms of Vincent's angina in the throat may be present as saprophytes as are streptococci. As much caution should be used in

1. MacGruer and Rubenstein: Acute Pemphigus of the Throat, with Positive Vincent's Angina, Arch. Otolaryng. **3**:259 (March) 1926.

diagnosing lesions of the mouth as Vincent's angina as in diagnosing as septic pharyngitis every condition of the throat which shows streptococci in the cultures. Vincent's ulceration should be diagnosed from the appearance of the lesions, with a minimal consideration of the results of the laboratory examination.

Clinical Notes

NEW ANTRUM AND FRONTAL RASPS

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The probe point frontal rasp is designed for intranasal operations. The probe point is so small that it will enter the same sized opening that a silver probe can enter, thereby enabling the physician to obtain an entry to the frontal opening, in most cases without forcing an instrument blindly through the floor of the frontal sinus. When the instrument has entered the opening it is gently manipulated, and the floor about the opening is broken down until the larger blunt pointed rasp, or the W. P. Reaves frontal punch, can be inserted. The teeth on these rasps are fine and sharp and cut away the edge of the floor instead of tearing it. The instruments are designed to remove as much of the floor as possible without destroying a large part of the mucosa about the nasofrontal duct. This is accomplished chiefly because the instrument is

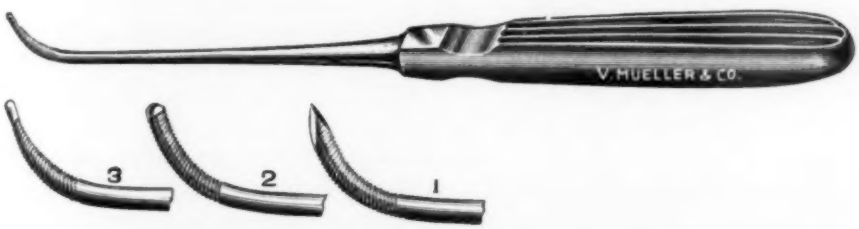

Fig. 1.—New antrum and frontal rasps used for intranasal operation; *1*, the antrum rasp; *2*, the blunt point frontal rasp; *3*, the probe point frontal rasp.

small, with a short rasping surface, fine cutting teeth and a delicate sense of touch which is imparted through the instrument. I have been using the probe point frontal rasp for six years, and feel that it is one of my most valuable instruments. I use the angle biting forceps (Gruenwald's) to remove as many tags of tissue as possible about and below the opening. This technic has enabled me to obtain results in most cases without resorting to radical (external) operations.

The antrum rasp was designed to enter the antrum so that a biting instrument could be inserted (I prefer the W. P. Reaves antrum punch) and the edges of the opening smoothed off after the biting instrument had been used. The rasp is small enough to enable one to enter almost any antrum, even that of a child. The rasping surface is short so that when it is properly handled the mucosa is not removed from the inferior turbinate and the inferior meatus. The teeth, which are fine and sharp, cut instead of tear. The instrument is not designed to be used alone for the operation, but can be used for this purpose better than most of the rasps on the market.

Progress in Otolaryngology

TUMORS OF THE NOSE AND THROAT

A REVIEW OF THE LITERATURE *

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Huizinga [1] reports three cases of retention cysts situated laterally in the vestibule of the nose. The cysts were removed through an incision underneath the upper lip. Microscopic examintion showed them to be lined with flat squamous cell epithelium and filled with cholesterin. Of the sixty cases that I reviewed from the literature, the patients were almost all women; however, among my own three patients one was a man.

ANTRUM

I have reported the end-results of cautery and radium treatment of ninety-seven patients who were suffering from malignant tumor of the antrum, from 1917 to 1924.[2] Of the seventy patients with primary tumors of the antrum, twenty-one (30 per cent) were still living from one year and three months to eight years after treatment, and of twenty-seven treated for secondary tumor of the antrum, fourteen (51.8 per cent) were still living from one year and three months to eight years afterward. I concluded that the use of cautery and radium in the treatment of malignant tumor of the antrum eliminates death at operation and cures more patients than have been cured previously by an operation.

PHARYNX

Barco [3] reports sixty-three cases of fibrolipoma of the larynx, one of which was his own. He discusses the possible cause of such tumors and reviews symptoms, bringing out a point made in Wood's case two years previously, that the structure of the vertebral column may undergo modifications in adapting itself to the form of the tumor. There may be

* From the Section on Laryngology, Oral and Plastic Surgery, Mayo Clinic. This review consists of the more important papers that have been published from October, 1925, to October, 1926, inclusive. It has been impossible to review certain foreign articles and also articles published in this country during the last three months of 1926 on account of the short time allotted for the preparation of this summary. Most of the papers have been reported by simply suggesting their contents; further details may be obtained by consulting the bibliography.

1. Huizinga, Eelco: Over Cystes bij den Neusingang, Nederl. Tijdschr. v. Geneesk. **1**:252 (Jan. 17) 1925.

2. New, G. B.: Malignant Tumors of the Antrum of Highmore, Arch. Otolaryng. **4**:201 (Sept.) 1926.

3. Barco, P.: Fibrolipoma a Sede Rara, Ann. Italianai di Chir. **4**:430, 1925.

pressure on the vagus or sympathetic nerves causing cardiac disturbances. The cervical or the brachial plexus may manifest symptoms due to pressure. He reviews the differential diagnosis of the malignant tumors, the congenital cysts and other growths of this kind. The tumor may be removed either through the mouth or through the neck from the outside. An incision anterior to the sternomastoid muscle is the most satisfactory method of removing large tumors.

In an article on surgical diathermy in laryngology,[4] I have emphasized the work of Broders in the grading of epitheliomas. He believes that the grade four epitheliomas are better taken care of by physical agents, such as roentgen ray or radium, and that low-grade epitheliomas are better cared for with diathermy and operative procedures. For malignant lesions of the larynx, laryngofissure and laryngectomy is the treatment of choice. Surgical diathermy has a distinct place in treatment for benign and malignant lesions about the nose, throat and mouth, including epitheliomas of the larynx and malignant lesions about the accessory sinuses, pharynx and mouth.

Herriman [5] reports a case of lipoma of the pharynx. The description of the unusual character of the tumor in the pharynx is the only important part of the report other than the review of the literature. The tumor was small and shelled out readily.

LARYNX

Tucker [6] reports fifteen cases in which laryngofissure was performed for early cancer of the larynx. He recommends the operation for early, anterior, intrinsic cancers of the larynx when metastasis or arytenoid fixation is absent. He demonstrates a rather ingenious method of eradicating growths in the anterior commissure. The method would seem satisfactory except in cases in which the perichondrium is involved, which would necessitate removal of part of the cartilage along with the growth. He advises biopsy before thyrotomy, but waits forty-eight hours for the tissue to be put through the embedding process. Frozen sections of the tissue with immediate operation, if it proves to be malignant, would seem preferable. The question of preoperative and postoperative irradiation depends largely on the microscopic grading of the tumor.

Thomson [7] discusses thoroughly the indications for thyrotomy or laryngectomy in the treatment of cancer of the larynx. His results have

4. New, Gordon B.: Surgical Diathermy in Laryngology, Arch. Otolaryng. **3**:301 (April) 1926.

5. Herriman, F. R.: Lipoma of the Pharynx, Laryngoscope **36**:339 (May) 1926.

6. Tucker, Gabriel: Laryngofissure for Cancer of the Larynx, Arch. Otolaryng. **3**:20 (Jan.) 1926.

7. Thomson, St. Clair: Cancer of the Larynx, Arch. Otolaryng. **3**:37 (Jan.) 1926.

always been better than those of other surgeons in this country, and apparently his patients had a more advanced condition of the disease. It would be interesting to know the microscopic grading of his excellent group to see whether they are in accord with the present opinion as to its prognostic value.

Imperatori [8] reports the use of radium in the larynx and laryngopharynx in fifty-three patients during a period of three years. He believes that radium is of little value in the treatment of cancer in this region.

Colledge [9] reports the results in fourteen cases of total laryngectomy. Three patients who had had a recurrence of the tumor died at the time of the operation. One patient died from another cause, and seven patients were well without recurrence for more than a year. The time since the operation is not long enough to determine the end-results.

In this country most roentgenologists have given up the treatment of cancer of the larynx by the roentgen ray, but Prinz [10] reports thirteen cases in which roentgen-ray treatment was used. Eleven patients died; one lived five years and seven months without recurrence, and died from influenza; one lived three and a half years, and two lived more than two years after treatment. Two patients are still living, one four years and seven months, and one (with lymphosarcoma) two years after treatment. Three patients are still under treatment, but as the time since the beginning of the treatment has been so short, definite conclusions as to the results cannot be made.

MacKenty [11] has prepared a careful review of both laryngofissure and the one-stage laryngectomy for cancer of the larynx. The technic is given in detail. His results, considered in a previous report, were most satisfactory.

In a discussion of carcinoma of the larynx,[12] I have given the technic for two-stage laryngectomy. In the first stage, a median incision is made from the chin to the manubrium. The hyoid bone is divided and the larynx and trachea skeletized. Iodoform gauze is packed at the sides of the trachea, but not back of it, as suggested by Dinsmore. In about four days the trachea is opened, and four days after this the larynx is removed. The operations are performed under paravertebral anesthesia. Following the second stage, the wound is closed completely without drainage.

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8. Imperatori, C. J.: Carcinoma of the Larynx and Laryngopharynx Treated with Radium: An Analysis of Thirty Cases, Arch. Otol. **4**:151 (Aug.) 1926.

9. Colledge, Lional: Fourteen Cases of Total Laryngectomy for Intrinsic Cancer of the Larynx, J. Laryng. & Otol. **41**:19 (Jan.) 1926.

10. Prinz, R.: Ueber die Röntgenbehandlung des Kehlkopfkrebses, Beitr. z. klin. Chir. **135**:426, 1926.

11. MacKenty, J. E.: Cancer of the Larynx. Arch. Otolaryng. **3**:205 (March) 1926.

12. New, G. B.: Carcinoma of the Larynx, Minn. Med. **9**:365 (July) 1926.

Donadei [13] reports a case of fibromyxoma of the glosso-epiglottidean fossa and reviews the literature on the disease. The tumor was 5 cm. in diameter and was removed under local anesthesia. Such tumors are of interest because of their size and possible interference with respiration or phonation.

TRACHEA

McCrae [14] describes the case of a woman, aged 37, who entered the hospital complaining of loss of power in the right arm and right leg, dyspnea and cough, and nausea and vomiting. The past history was negative. Three months previously she had contracted a cold in the chest, and had a cough but was without fever. Following this, pain appeared in the right side of the chest, which was tapped twice at intervals of four weeks, and 2 quarts of clear serous fluid was obtained each time. Her arm and leg had been paralyzed about six weeks. She was considerably nauseated, and vomited occasionally. Examination of the thorax showed limited expansion on the right side, flatness and the absence of breath and voice sounds. The heart was displaced to the left. Roentgenograms of the chest showed an increase in the peribronchial shadow of the left lung. At necropsy the right lung was found collapsed. The lumen of the right bronchus was narrowed by a hard, dense, pearly white mass which had invaded the lung tissue surrounding it. Metastasis had extended to the mediastinal and mesenteric lymph nodes, the pleura, liver, one ovary, suprarenals and brain. Microscopic examination showed a gelatinous or mucoid carcinoma.

Polayes [15] reports the case of a woman, aged 52, who complained of pain in the right shoulder, swelling in the neck and enlargement of the right hand. She was weak, coughed with bloody expectoration, and aphonia and dyspnea were marked. Roentgenograms did not reveal mediastinal tumor. At postmortem, a mass was found which embraced all the large vessels, the trachea, the root of the lung and the heart. Microscopic examination showed squamous cell epithelioma.

Bowing and Vinson [16] report the use of surgical diathermy in the treatment of an inflammatory tumor arising from the right posterior wall of the trachea just above the bifurcation. The results were satisfactory, and they emphasize the desirability of this form of treatment in tumors in this situation that would be difficult to manage satisfactorily in any other way.

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13. Donadei, G.: Fibromyxoma of the Left Glosso-epiglottic Fossa, Bollettino delle Malattie dell Orecchio della Gola e del Naso **43**:125, 1925.
14. McCrae, Thomas: Carcinoma of the Bronchus: Hemiplegia, a Diagnostic Study, Med. Clin. N. Amer. **10**:1 (July) 1926.
15. Polayes, S. H.: A Primary Squamous Cell Epithelioma of the Trachea, Proc. New York Path. Soc. **25**:100, 1925.
16. Bowing, H. H., and Vinson, P. P.: Surgical Diathermy for Tumors of the Trachea, Laryngoscope **36**:217 (March) 1926.

ESOPHAGUS

Numerous articles have appeared in the literature during the last year on the diagnosis and management of carcinoma of the esophagus.

Myerson [17] advocates dilatation and intubation, and calls attention to the swallowed thread as an aid in the diagnosis of esophagotracheal fistula.

Schreiner [18] and others report a series of sixty-three cases of cancer of the esophagus observed over a period of twelve years, in sixteen of which gastrostomy had been performed. Life was prolonged ten months for one patient by gastrostomy; the remaining fifteen patients died within from a few days to two and one-half months after the operation. After irradiation, one patient lived sixteen months.

Abel [19] believes that esophageal cancer is always mildly malignant. He is opposed to gastrostomy but advocates an operation, if it is possible, and if not, he recommends dilatation.

Yankauer [20] describes a method of applying radium in esophageal cancer.

Jackson [21] makes a plea for the early diagnosis of esophageal cancer. He states that the means of diagnosis, as advocated in textbooks, are always negative in the early stages of the disease. He believes that every patient with a so-called globus would be subjected to esophagoscopy.

Sweetser [22] advocates dilatation for esophageal carcinoma and emphasizes the value of a swallowed thread for guiding the dilator through the stricture.

Vinson,[23] Moore and Bowing observed a case of hemangioma of the esophagus in which the patient was greatly benefited by esophagoscopic irradiation of the tumor.

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17. Myerson, M. C.: The Management of Carcinoma of the Esophagus, Surg. Gynec. & Obst. **43**:690, 1926; Intubation of the Esophagus for Carcinomatous Stricture, Am. J. Surg. **40**:56 (March) 1926.

18. Schreiner, B. F.; Eschelman, K. F., and Kress, L. C.: Radiation Therapy in Cancer of the Esophagus Based on a Study of Sixty-three Cases, J. Cancer Research **10**:208 (July) 1926.

19. Abel, A. L.: The Treatment of Cancer of the Esophagus, Brit. J. Surg. **14**:131 (July) 1926.

20. Yankauer, Sidney: Radium in Carcinoma of the Esophagus: Method of Application, Arch. Surg. **12**:247 (Jan.) 1926.

21. Jackson, Chevalier: Why does not the Thoracic Surgeon Cure Cancer of the Esophagus? Arch. Surg. **12**:236 (Jan.) 1926.

22. Sweetser, H. B., Jr.: Stenosis of the Esophagus, Jour. Lancet **46**:227 (May 15) 1926.

23. Vinson, P. P.; Moore, A. B., and Bowing, H. H.: Hemangioma of the Esophagus, Am. J. M. Sc. **172**:416 (Sept.) 1926.

Abstracts from Current Literature

Ear

A Method of Removing the Organ of Hearing from the Cadaver Without Cosmetic Defect. Von Gyergyay, Ztschr. f. Hals-, Nasen- u. Ohrenh. **15**: 221 (Nov.) 1926.

A trephine of appropriate size is placed on the planum mastoideum, with the axis in the direction of the antrum tympanum, toward the tips of the roots of the first and second molar teeth of the opposite side, and set in motion. The resulting excision includes the antrum with cellulae mastoidiae, the membrana tympani and tympanum, the medial portion of the external canal, the labyrinth, the eustachian tube and part of the nasopharynx, in one piece, well isolated from the other tissues.

Contribution to the Theory of Caloric Nystagmus. Leisse, Ztschr. f. Hals-, Nasen- u. Ohrenh. **15**:222, 1926.

This author used tiny cold cotton tampons, which were placed respectively against the membrana tympani and against the upper posterior wall of the external canal, timing the reaction from each location. In the large majority of tests, the reaction (nystagmus) occurred in less time from the superior posterior part of the bony canal. From this, the author reasons that the stimulus of the cold is carried to the labyrinth by physical means (as theorized by Bárány), rather than by reflex tonus changes in the blood vessels, which are more numerous in the tympanic membrane.

Lewy, Chicago.

The Inflammatory Processes in the Course of Mastoiditis. Josef Beck, Ztschr. f. Hals-. Nasen-. u. Ohrenh. **15**:256 (Nov.) 1926.

The author states that the inflammatory process extends principally along blood vessels, and therefore spreads especially along the marrow spaces, but also along the vessels in the haversian canals. Cell infiltration of the marrow spaces takes place, accompanied by edema and hemorrhage. The fat becomes fibrosed, so that it can be called an osteomyelitis fibrosa. The fibrosis may be converted into bone. Empyema of the cells usually occurs; it is not a necessary part of mastoiditis, but only a part of the picture. The author shows pictures in which the cells are empty, and which are without reaction while the bone elsewhere shows severe inflammatory changes. The process may be productive as well as destructive of bone.

The mastoids with partially inhibited cell formation, which have the largest marrow spaces, and, as shown by Witmaack, the thinnest layer of cells, have the least resistance to inflammation. The sclerotic mastoid has few marrow spaces, and therefore it has few vessels. It shows little reaction to inflammation. It does not often develop mastoiditis, but, on the other hand, infection may spread through such bone to the cranial contents without sufficient reaction to defend the organism against this spread. Even in well pneumaticized mastoids intracranial extension may occur without resorption of bone, and in such cases it is difficult to decide the proper time to operate.

Lewy, Chicago.

THE PROBLEM OF BONE CONDUCTION: THEORETICAL CONSIDERATIONS. HERZOG, Proc. German Otolaryng. Soc., Ztschr. f. Hals-, Nasen- u. Ohrenh. **15**:300 (Nov.) 1927.

The author, formerly a follower of Bezold's theory that conduction of sound purely by bone does not exist, has changed his view. Small mirrors were fastened at various places on the conduction apparatus and on the temporal bone, transferring photographically to a kymograph the vibrations induced by a tuning fork. These experiments did not support the Bezold theory of exclusively craniotympanal conduction, but rather strongly indicated direct transmission of an appreciable volume of vibrations from the bony walls of the labyrinth to the perilymph. Therefore, two sets of vibrations are transmitted to the sensory epithelium: those directly from the bony walls of the labyrinth and those transmitted via the membrana tympani, ossicular chain and footplate of the stapes (the active movement of the stapes). It was found that the latter are slightly delayed; therefore a slight difference in phase exists. This difference in phase is believed to cause a damping and therefore a lessening of hearing by bone is brought about by the ossicular chain. If the chain is fixed, the vibrations direct from the bony wall are unhindered and strengthened and the stimulus to the sense organ is increased (increased bone conduction; lateralization).

Another test is described as follows: The ends of a U tube filled with water are closed by membranes. On one of the membranes is set a "tappet" to imitate the stapes footplate. It was found that the more the movement of the "stapes" was limited, the more strongly the vibrations of a tuning fork against the tube were perceived at the "round window."

There is much theoretical discussion which will have to be read in the original.

LEWY, Chicago.

CALCIFICATION, OSSIFICATION OF CONNECTIVE TISSUE AND CONCREMENT FORMATION WITH SPECIAL CONSIDERATION OF THESE PROCESSES IN THE HUMAN TYMPANIC CAVITY. MAX MEYER, Ztschr. f. Hals-, Nasen- u. Ohrenh. **16**:481 (Nov. 8) 1926.

Two peculiar cases of calcification and ossification in the tympanic cavity, which occasioned a thorough investigation of the processes involved, and a consideration of the literature are presented. The exhaustive and comprehensive treatise does not lend itself to a short abstract, and must be studied in the original.

THE SIGNIFICANCE AND VALUE OF MICROSCOPIC INVESTIGATION OF MIDDLE EAR SUPPURATION IN SERIAL SECTIONS. E. SCHLITTLER, Ztschr. f. Hals-, Nasen- u. Ohrenh. **16**:516 (Nov. 8) 1926.

General otologic experience teaches that endocranial complications during a chronic suppuration of the middle ear rarely occur except in the suppuration with an epitympanal perforation, that is complicated with cholesteatoma. The simple form of chronic suppuration of the middle ear with a tympanal perforation is considered to be without danger, because apparently it never ends fatally.

Statistics of investigations by Scheibe, Schlittler and Hofmann, which covered a large amount of material, confirm this view. Of seventy-three deaths caused by ear trouble in Bezold's clinic in Munich (1881-1910), thirty-seven had been caused by cholesteatoma, whereas the simple chronic suppuration

of the middle ear caused only one death. Of fifty-eight deaths in Siebenmann's clinic in Basel (1898-1917), twenty-three were caused by cholesteatoma. During twenty years, death has never been observed in a simple chronic suppuration of the middle ear without cholesteatoma.

Recently Uffenorde, Engelhardt and Hofmann have reported cases of a simple tympanic chronic suppuration of the middle ear which ended fatally. Uffenorde's first case, however, was doubtless an acute exacerbation of a chronic suppuration of the middle ear. The other withstands any criticism. The epitympanum was separated from the mesotympanum by formation of granulation tissue and of new bone, especially on the physiologically narrowed spot where the chorda tympani passes between the hammer and anvil. A retention of pus occurred in the aditus and in the antrum, the tegmen antri melted, and an abscess of the temporal lobe resulted. The infrequent occurrence of such a retention during a simple chronic middle ear suppuration is due to the fact that the swelling of the mucous membrane of the middle ear is not pronounced, and that drainage from the aditus and antrum is good. An empyema cannot develop because there are few peripheral pneumatic cells.

In Engelhardt's patient, the mechanism of propagation is not clear. There was no retention. The patient had influenza. Microscopic examination of sections, in Hoffmann's patient, proved that a cholesteatoma was the cause of a sinus thrombosis and meningitis. Clinical differentiation between the two forms of chronic suppuration of the middle ear is sometimes impossible without a histologic examination. It is equally difficult to differentiate between the acute and chronic form. A cholesteatoma with acute exacerbation can be confused with an acute suppuration of the middle ear. Two cases in point are cited. The author stresses the necessity for a histologic examination of cross-sections, if far-reaching and practical conclusions are to be made concerning the dangers of the various forms of suppuration of the middle ear.

AMBERG, Detroit.

Pharynx

LOCALIZATION AND DIAGNOSIS OF FOCI OF CHRONIC INFECTION IN CHRONIC TONSILLITIS. RUFF, Ztschr. f. Hals-, Nasen- u. Ohrenh. **15**:157 (Nov.) 1926.

Acute tonsillitis spreads in two ways, either superficially as a diffuse catarrhal or as a fibro-membranous inflammation, or from a primary defect (ulcer) into the depth of the tonsil, usually from the base of a crypt, resulting in phlegmonous tonsillitis or, if deep enough, in peritonsillar abscess.

The superficial catarrhal form may be followed by resolution and a normal condition may result; the fibromembranous form results in a subepithelial cicatrix. The ulcerative and phlegmonous forms heal with scar formation. In many cases the healing is not complete, but exudation and proliferation persist as evidence of a chronic irritation, associated with keratosis of the crypt epithelium and infiltration with leukocytes, lymphocytes and plasma cells. The clinical diagnosis of chronic tonsillitis is more difficult. Color, size and consistency are not conclusive; an irregular, torn surface, from the cavities of which abnormal exudate may be pressed, which shows a large preponderance of leukocytes, is of more value. The surest guide is a definite history of repeated attacks of angina. In a chronic inflammation the tendency to resolution is lost.

There are four sites of predilection for chronic inflammation: the upper tonsillar fossa, the lower tonsillar fossa, the supratonsillar fossa and infratonsillar (retroplicar) fossa. The upper tonsillar fossa is often divided from the lower (or sinus tonsillaris) by the plica transversus, which may also divide the

tonsil into two distinct parts if two poles are present, or it may only partially divide the two poles. If only one pole is present, the plica transversus may be above or below it, depending on which pole has developed—the upper or the lower. The clinical history and pathologic conditions are given in detail in fifty-three cases, from which the conclusions given above are drawn.

ANGINA AGRANULOCYTICA. BRUEGGEMANN, Ztschr. f. Hals-, Nasen- u. Ohrenh. **15**:187 (Nov.) 1926.

That tonsillitis is a general disease, and that it is improbable that the tonsils are the port of entry of the infection, is generally accepted. Therefore, study of the blood picture has atracted more attention and has led to the recognition of agranulocytosis (Schulz) or angina agranulocytica (Friedmann) which runs a severe course and results in the patient's death in a few days or weeks, from septicemia or septicopyemia.

The onset is usually sudden, with high fever and prostration and a fibrinous or gangrenous exudate on the tonsils spreading to the gums, tongue, larynx, genitalia and floor of the mouth, sometimes showing brawny edema. The disease is not characterized by hemorrhagic diathesis, icterus or noteworthy enlargement of the liver or the spleen. There is swelling of the intestinal glands. The characteristic feature is that the blood picture does not show a change in hemoglobin or red cells, but a low white count with the absence of granular neutrophils and eosinophils and a relative increase in monocytes (40 per cent) with irregular nuclei and about 60 per cent large lymphocytes. There is a great reduction of granular cells in the femur and spinal marrow. A few lymphoids are present, including azurophil granular elements and megakaryocytes and supporting cells. Blood cultures are sterile, and cultures from the nose and throat are not characteristic.

Some cases do not show such characteristics, and in some the condition occurs after other prolonged infections. The therapy is expectant. In making a differential diagnosis the following must be considered: In acute leukemia there is an increase in white cells; in aleukocythemic leukemia there is an increase in lymphoid cells, and splenic enlargement; amyelia is accompanied by anemia and hemorrhagic diathesis. The important differentiation is from monocyte angina, which has a favorable prognosis but many symptoms in common with angina agranulocytica. Monocyte angina is accompanied by general adenitis and enlargement of the liver and spleen; the blood contains about 80 per cent of large mononuclears. The acute myeloblast leukemia with the aleukemic blood picture is accompanied by severe anemia and hemorrhagic diathesis, also a decrease in platelets. In aleukemia there is a decrease in red, white and platelet cells. The author discusses the question as to whether the condition is a specific infection, is due to the absence of some hormonal factor or is an autogenous or exogenous toxemia. (Animal experiments have shown that leukocytes may be destroyed by benzene.) The author recommends the study of the blood picture in all types of angina in order to learn something more about this disease, of which so few cases have been reported.

PHYSIOLOGY OF THE TONSIL. LUESCHER, Ztschr. f. Hals-, Nasen- u. Ohrenh. **15**:191 (Nov.) 1926.

This author finds, by the Warburg method, that the tonsils have a definite glycolytic function (measured by oxygen consumption). Tonsils which are hypertrophied but not inflamed show hyperfunction. This function seems to reside in the tissues and lymphocytes. It is not found in a Ringer solution extract from the tonsils. The tonsils show the highest glycolytic function of any of the body tissues, the lymphatic glands being next. Occasional malignant tumors exceed the tonsils in glycolytic power.

TONSILLECTOMY IN SINGERS. STERN, Ztschr. f. Hals-, Nasen- u. Ohrenh. **15:** 193 (Nov.) 1926.

This author advises tonsillectomy in singers on the same indications as in others, but the operative technic must be meticulously careful, cutting or pulling the soft palate and pillars being avoided. Graded exercises for the voice should be begun within two weeks after the operation. Stern gives a long and detailed account of such exercises.

In nervous singers, and those who have a poor technic, he advises against operation, as they are likely to develop paresthesias or other psychic disturbances for which the surgeon will be blamed, regardless of how excellent the technical work has been. When these precautions have been taken, Dr. Stern has not seen any unfavorable results from the operation, but often great relief from the ill effects of chronic tonsillitis, and an improvement in the voice.

LEWY, Chicago.

A TYPICAL FIBROMA OF THE NASOPHARYNX IN A GIRL. JOSEF SCHLEGLMUENIG, Ztschr. f. Hals-, Nasen- u. Ohrenh. **17:**1 (Dec. 18) 1926.

The author describes a typical polyp of the nasopharynx in a girl, aged 13. It was the size of a hen's egg, with a broad base, which, under the microscope, showed signs of a hyaline degeneration. Coenen thinks that the basal fibromas are tumors of the skeleton, and that they develop from the embryonic chondrocranium.

AMBERG, Detroit.

BIOCHEMISTRY OF THE TONSILS. ERY LUESCHER, Ztschr. f. Hals-, Nasen- u. Ohrenh. **17:**60 (Dec. 18) 1926.

1. The method of Warburg permits one to make metabolic tests with a few milligrams of surviving tissue. Therefore it is especially adapted to clinical purposes in making microdeterminations.

2. The method applies to the investigation of the utilization of oxygen (breathing) and of carbohydrate metabolism of the tonsil. The results refer to the behavior in Ringer's solution.

3. The normal tonsil shows considerable utilization of oxygen, and pronounced glycolysis (fermentation) takes place in them. The relation of fermentation to breathing is greater than in all other normal tissues.

4. This holds good also for adenoids. It seems to be a special quality of the germinal centers of peripheral lymph nodules.

5. Not only does the tissue act in this manner, but also the lymphocytes of the tonsil which wander to the surface through the epithelium.

6. The glycolytic effect is not present in salty extracts. Therefore it is not bound, in larger quantities, to extracellular colloidal material or to material in solution.

7. The hypertrophic tonsil differs from the normal tonsil by increased utilization of oxygen and more fermentation (there may be relatively more fermentation than oxygen). It presents a hyperfunction and dysfunction compared with the normal.

8. The thymus differs from peripheral lymph nodules by the absence of almost all fermentation. Lymph glands differ also in one person. Some show a relatively considerable fermentation, some almost none. The peripheral lymph nodules show great fermentation continuously, whereas the lymph glands show fermentation only at times.

9. Under certain circumstances, lymphocytes contain a substance of great glycolytic effect, which is bound fast to the cell.

10. Hypertrophic tonsils plainly show involution caused by age. Breathing and fermentation begin to decrease between the sixteenth and twentieth years. They decrease by about one half.

11. Sex has no influence on this metabolism.

12. Seasons seem to have an influence. The rate of metabolism is lower in spring and summer than in winter.

13. The total metabolism of the normal, and especially of the hypertrophic, tonsil is high, compared with that of other organs.

14. On account of their glycolytic quality, the penetrating lymphocytes are probably able to live anaerobically in the presence of hexoses. They keep the surface of the mucosa free from sugar.

(Hence the culture medium for bacteria is less favorable, and their virulence may become less.)

AMBERG, Detroit.

Nose

THE SIGNIFICANCE OF THE GERMINAL SUBSTANCE IN THE INCIDENCE OF OZENA. ALBRECHT, Ztschr. f. Hals-, Nasen- u. Ohrenh. **15**:209 (Nov.) 1926.

This author investigated twenty-five families, whose family trees he had diagrammed; they showed a decided tendency to have either atrophic rhinitis or ozena. His conclusions were: (1) A tendency to chronic inflammation is present in the mucosa; (2) the membrane reacts to the inflammatory agent according to its hereditary tendency by an atrophic change; and (3) the form and width of the nose is an etiologic factor. As to whether or not the specific odor of ozena is due to the Perez coccobacillus, the author has not yet decided.

FOUR YEARS' CLINICAL EXPERIENCE WITH THE SURGICAL TREATMENT OF OZENA BY IMPLANTATION OF MACERATED SPONGY BONE OF CATTLE. ECKERT MOEBIUS, Ztschr. f. Hals-, Nasen- u. Ohrenh. **15**:214 (Nov.) 1926.

The technic was described in detail in 1923 *(Ztschr. f. Hals-, Nasen- u. Ohrenh)*. Further experience has shown that the more porous the bone, the more easily the granulation tissue grows through it. For this reason several small pieces are used, which are easier to introduce than larger ones. The interior of the nose should be carefully cleansed and iodine painted in the vestibule. Eighteen patients have been under observation for from three to four years; there was perfect healing in nine; the other nine extruded small pieces of bone, but retained most of it, and in five, lesions of the mucosa were caused. The operation was unsuccessful in only three of the patients; of the remaining fifteen, six are clinically cured without any after-care, and nine are greatly improved, requiring an irrigation of the nonoperated side.

During the last three years sixty patients have been operated on, with what he believes will be even better results. In conclusion the author says that he believes this operation is the simplest and best.

LEWY, Chicago.

Miscellaneous

CLINICAL VALUE OF ROENTGENOGRAMS OF THE TEMPORAL BONE. P. L. MAGNIEN, Arch. internat. de laryngol. otol. rhinol. et br.-oesoph. **5**:1158 (Dec.) 1926.

From the point of view of roentgen-ray examination, the temporal bone has three outstanding parts: squamous, mastoid and petrous. A special technic is required to make roentgenograms of each of these parts. In children under 8 years of age, however, roentgenograms show nothing except in the cochlear and ossicular parts of the mastoid.

Roentgenograms of the squama are indicated in osteitis, osteomyelitis and fractures of the region. They are also useful to detect aberrant cells and especially to isolate a form of mastoiditis studied and described by Nouret and Seigneurm under the name of paramastozygomatic temporal mastoiditis.

Roentgenologic examination of the mastoid is comparatively easy. Three structural types of mastoid may be encountered. The pneumatic and diploic types are considered normal and the dense type pathologic. Traumatic lesions, osteitis and mastoiditis are indications for a local roentgen-ray examination.

In acute osteitis and mastoiditis, three different pictures are obtained, each corresponding to a given stage in the evolution of the disease. 1. A slight haze of the mastoid cells indicates more or less inflammatory reaction of the mucosa with formation of exudate. 2. At a more advanced stage of the infection a certain calcareous rarefaction takes place in the mastoid, and the lessened density of the bone is shown on the roentgenograms. 3. In empyema of the mastoid, bone is resorbed as detected by a dense shadow on the roentgenograms.

Roentgenologic aid is frequently of advantage in the diagnosis of chronic mastoiditis accompanied by chronic otitis. The dense type of mastoid is considered pathologic by the author. Densification and atrophia of the mastoid on one side as compared with that on the other side are two definite roentgenologic signs of chronic mastoiditis.

Roentgenologic studies of the petrous portion of the mastoid are useful, not only in traumatic lesions, but also in neurotic lesions such as those which occur in cerebellopontile tumors and tumors of the acoustic nerve.

The lines of fractures more easily detectable are the perpendicular and oblique ones. The technic of Hirtzsor Deutsh and that of Mayer are advisable in making roentgenograms of the petrous portion in case of parallel fractures. In compensation work and industrial medicine, roentgenology is useful in eliminating fractures when otolabyrinthine lesions follow trauma.

According to Cushing, Alajouanine, Guillain and Girot, cerebellopontile tumors give such roentgen-ray signs as: dilatation of the internal auditory meatus, bone rarefaction and atypical pneumatization of the tip of the petrous portion, the peripheral outline of which appears to be more or less hazy.

In Gradenigo's syndrome, there are lesions of osteitis shown on roentgenograms by zones of transparency corresponding to the osteitic lesions and sometimes by complete absence of the tip of the petrous portion of the mastoid.

This article then deals with roentgenologic study of the lateral sinus transparent in pathologic conditions, of the eustachian tube and of foreign bodies in the region of the temporal bone. To outline a postoperative cavity of the mastoid region, the use of an opaque mixture of bismuth subnitrate and iodized oil has proved to be of definite value, more so with good stereoscopic roentgenograms.

AUCOIN, Montreal.

THE INFLUENCE OF VISION ON THE VESTIBULAR TURNING NYSTAGMUS AND AFTER-NYSTAGMUS. I. OHM, Ztschr. f. Hals-, Nasen- u. Ohrenh. **16**:521 (Nov. 8) 1926.

Investigations covering many years have proved to the author that optic and vestibular factors are so closely connected in nystagmus that they can be separated only with difficulty. His methods, based on the optic point of view, have not been accepted by otologists; therefore he discusses the subject from

the vestibular point of view. Vestibular irritations proceed by way of Deiters' nucleus and of the posterolongitudinal fibers to the ocular nuclei, and do not pass the cortex of the brain, as Hoegyes has shown, and de Kleyn and Magnus have confirmed. Breuer observed nystagmus after movements of the head with closed eyes and in blind people. He knew that nystagmus is more pronounced when strong convex glasses are used. Therefore otologists use frosted glasses (Bárány) or those with lenses of +20 diopters (Bartels).

The author devised an ingenious apparatus for his examination, which demands a fixation of the head. A kymograph is attached to the turning chair. The vestibular nystagmus can be examined best in a dark room. Nystagmus occurring while the patient is turning in the light has an optic and vestibular cause. It does not make any difference whether the space is turned around the person examined, or the person is turned in the room, provided that he can see, and that his eyes are open. In both instances an optic turning nystagmus occurs. The author uses this term, because it corresponds with the vestibular turning nystagmus. Jerking occurs in both types. It was present in the two cases reported. The combination turning nystagmus, in the light, was in both cases mostly pendular. The amplitude surpasses that of the vestibular nystagmus in the dark room. He suggests making the turning experiment with deaf-mutes in the light and in the dark room. Vestibular after-nystagmus is fully developed in the dark room, whereas it either does not occur in the light room, or it is confined to a few excursions. It is quickly retarded by vision in the light. This is of special importance for the conception of the author, who has collected material for years, showing that the optic nystagmus occurs sooner in the dark, and is also of larger amplitude in the dark, but of less frequency. Ohm is convinced that the optic nystagmus emanates from Deiters' nucleus. Recent investigations in multiple sclerosis and in syphilis of the vestibular apparatus showed this result. The graphic curves prove that an undoubted vestibular nystagmus completely harmonizes with the optic nystagmus in its behavior toward light and vision. Ohm's view, for which he has fought for years but which is still not accepted, is in his opinion newly confirmed, namely, that nystagmus is an abnormal state of irritation of Deiters' nucleus which presents itself first and strongest in the dark. He feels certain that it will appear in caloric and galvanic nystagmus in a similar way. He found it in compression nystagmus (fistula symptom). Thus, he believes that the optic-vestibular theory of miners' nystagmus is newly supported by these curves.

A Technical Contribution to Kuhn's Peroral Tube. Eugen Hopmann, Ztschr. f. Hals-, Nasen- u. Ohrenh. **16**:550 (Nov. 8) 1926.

A defect of Kuhn's tube is the obturator. Hopmann claims that the introduction of the tube is easier without the obturator. The short tube proved to be unsatisfactory. Hopmann used a longer tube, which reaches a distance of 2 cm. from the bifurcation. The average distance of the bifurcation from the teeth is 26 cm. in men; in women, 24 cm.; in children, between 5 and 10 years old, 18 cm.; in children up to 15 years old, 19 cm. Three sizes, 23, 21 and 15 cm. in length with a thickness of 10, 8 and 6 mm., respectively, suffice. By using the open tube alone, without an obturator, asphyxia never occurs. The head of the tube carries a rubber tube, which is placed around either the neck or the head, and fastened by an artery-forceps, to secure the instrument in place.

A New Auxiliary Measure to Create Head Resonance in Singers and Speakers. Emil Froeschels, Ztschr. f. Hals-, Nasen- u. Ohrenh. **16**:562 (Nov. 8) 1926.

The so-called "voix mixte" is considered desirable. Each tone should contain chest and head resonance. The production and increase of head resonance is difficult for many pupils, and even for well trained artists. Closing the outer canals of the ear increases the sound, which is helpful. If a singer places a finger airtight in the ear canals and sings or enunciates "M," a humming is noticed. If the pupil is told that a similarly strong humming occurs while singing or enunciating other sounds, if nasal resonance is present, he can find out whether the tone (sung or enunciated), contains nasal resonance. The method proved effective. Some persons cannot produce the humming if they place the lower jaw too low. In such cases by bending forward and opening the mouth less wide, the head resonance can be noticed. Advanced pupils are able to establish by this method whether the voice is mixed correctly. The procedure is not a panacea, but only an auxiliary measure.

Amberg, Detroit.

Seasickness. F. Leiri, Ztschr. f. Hals-, Nasen- u. Ohrenh. **16**:565 (Nov. 8) 1926.

Seasickness is probably caused by vestibular vegetative reflexes which enter into action during periods of motion of a boat when the acceleration is in the direction of gravitation. The pressure of the otoliths on the maculae acusticae decreases, and the vestibular nerve is irritated.

The otolith reflexes — a decrease of blood pressure and an increase of the tonus and peristalsis of the gastro-intestinal tract — are normally of importance for the individual while falling. All parts of the body, including the blood and the contents of the gastro-intestinal tract, lose weight in the downward motion, which might bring about disturbances in the circulatory system and in the digestive organs.

The efferent part of the reflex arc of the vestibular vegetative reflex is formed by the parasympathicus.

When the body strikes after a fall, the vestibular vegetative reflexes are compensated by a sympathicus effect which causes a rise in blood pressure and a decrease of the tonus in the gastro-intestinal tract. This, however, does not occur in a motion of the sea unless a mechanical excitation of the sympathicus, by a pushing effect, is present. Atropine has a paralyzing effect on the parasympathicus and is an effective remedy against seasickness, but it should be combined with epinephrine in order to produce an excitation of the sympathicus.

Mothersills Seasickness Remedy. G. Ioachimoglu, Ztschr. f. Hals-, Nasen- u. Ohrenh. **16**:577 (Nov. 8) 1926.

Fifteen years ago K. Feist analyzed Mothersills Seasickness Remedy. A bright red capsule contained: 0.075 Gm. cane sugar, 0.16 Gm. camphora monobromata and 0.0125 Gm. caffeine.

A light brown capsule contained: 0.0175 Gm. caffeine, 0.15 Gm. camphora monobromata, 0.0045 Gm. organic acid (probably citric acid) and 0.07 Gm. cinnamon powder and traces of cumarin.

Each package contains a certificate saying "I hereby certify that I have personally analyzed a sample of Mothersills Seasickness Remedy purchased by me in the open market in the City of Montreal, and my tests failed to detect the presence of opium, morphine, cocaine or any other alkaloid or chloral, whatever."

This is a falsification, because caffeine is an alkaloid. Ioachimoglu tested the remedy and came to the conclusion that it contained a mydriatic, namely, atropine or scopolamine, because Vitali's reaction was positive. Experiments have shown that 0.000245 mg. of atropine sulphate causes mydriasis in a cat's eye. From this observation the author deduces that 1 Gm. of the contents of the bright red capsule contains either 0.875 mg. of atropine sulphate or a tenth of that quantity of scopolamine. To the contents of two bright red capsules (0.56 Gm.) were added 50 cc. of water and two drops of diluted hydrochloric acid. This was warmed on the water bath and filtered after cooling. One drop of the filtrate (35 mg., with a dilution of 1:90) caused mydriasis in the eye of a cat. This solution was again diluted. A dilution of 1:125 caused evident mydriasis. Scopolamine is ten times as effective as atropine in the eye of a cat. The light brown capsules caused mydriasis with a dilution of 1:100. A package of the remedy (4.5 Gm.) costs wholesale 5.75 marks ($1.36). In order to procure a quantity of alkaloid which corresponds with 0.1 Gm. of atropine sulphate, one would have to buy 657 marks' ($156.42) worth of Mothersills Seasickness Remedy. According to the official price of the drug, the same quantity of atropine sulphate costs about five cents.

[On page 476 of the first edition of "Nostrums and Quackery," published by the American Medical Association, the following analysis of the pink powder is found:

	Per Cent		Per Cent
Chlorbutanol	46.1	Fatty Acid	18.2
Caffeine	7.9	Undetermined	0.8
Milk sugar	27.0		

The brown powder:

	Per Cent		Per Cent
Chlorbutanol	45.6	Fatty acid	20.3
Caffeine	8.3	Undetermined	1.0]
Cinnamon powder	24.8		

AMBERG, Detroit.

Society Transactions

CHICAGO LARYNGOLOGICAL AND OTOLOGICAL SOCIETY

Nov. 1, 1926

ARTHUR M. CORWIN, M.D., *President, in the Chair*

POLYLARYNGOSCOPE. Presented by DR. NORVAL H. PIERCE.

A polylaryngoscope which is equipped with eight tubes enables eight persons to examine the larynx at the same time. The instrument is in use at the College of Medicine, University of Illinois, and is proving entirely practical.

COMPARATIVE EMBRYOGENESIS OF THE PNEUMATIZATION OF THE MASTOID AND ACCESSORY NASAL SINUSES. Presented by DR. PIERCE.

This article will be published in full in a later issue of the ARCHIVES OF OTOLARYNGOLOGY.

MODERN FACILITIES IN DIAGNOSIS AND LOCALIZATION OF LESIONS OF THE BRAIN: THEIR RELATION TO THE OPHTHALMOLOGIST AND OTOLARYNGOLOGIST. Presented by DR. E. R. CARPENTER, Dallas, Texas.

As a rule, patients with lesions of the brain consult their physician, who frequently refers them to an ophthalmologist and otolaryngologist for investigation in regard to headaches and other disturbances of the cranial nerve. Investigation too often ceases at this stage. A proper diagnosis is not made in over 50 per cent of the chronic or recurrent forms of headache, but in at least 50 per cent a correct diagnosis is possible if proper investigation is made and the majority of these patients can be relieved by some surgical means. Atrophy of the optic nerve is the most frequent cause of loss of vision and most of this arises from unrecognized intracranial lesions, and could be avoided by early recognition of the cause. Tumors of the brain are the most frequent of all regional tumors. Their diagnosis is often difficult and requires thorough neurosurgical experience. The most important tests in this work are quantitative perimetry (Walker and Cushing), vestibular investigation as perfected by Bárány, the Holmes nystagmus test, and the replacement of the cerebrospinal fluid by injection with air in roentgenograms, as developed by Dandy, Bingle and others. The extent of the usefulness of these tests is not appreciated. Quantitative perimetry and vestibular investigation can be done satisfactorily only by ophthalmologists and otolaryngologists who are thoroughly proficient. Interpretation of the observations requires an intimate knowledge of the anatomy of the brain and physiology. Often the tests are valuable in the localization of a lesion, and as positive or negative evidence regarding the presence of a lesion somewhere within the cranial cavity. Encephalography by lumbar puncture, under local anesthesia, has been accompanied by severe reactions and occasional death, which has greatly restricted its use. A high mortality has accompanied the use of the ventricular method, principally because of the late stage at which it is now being employed. The tests would be of inestimable

value if the severe reactions could be avoided. Dr. Carpenter felt that personal examination justifies the assertion that reactions seldom occur and headaches are not severe when the lumbar puncture test is made under ether anesthesia with the patient in a sitting position. There is practically no danger from its use in normal conditions of the brain, and it is not a grave procedure in abnormal conditions except when highly increased intracranial pressure from tumors, abscess and hydrocephalus is present. Increased pressure from other sources does not necessarily restrict its use. Dr. Carpenter has performed the lumbar puncture test under ether anesthesia many times in his office, and has frequently permitted patients to return to their homes, from 50 to 100 miles distant, the same or the succeeding day. Meningeal headache may persist for three or four days but is usually controlled by the usual means, including opiates if necessary. Encephalography by the trephine method is strictly a hospital procedure, and the danger is in proportion to the development of the disturbance. Highly satisfactory results have attended the use of these methods in the personal examination of many patients when the diagnosis and localization could not be determined by any other means. The lumbar puncture test has been employed in many cases in which headache was the only complaint; also when convulsions, petit mal or dream states were present, and to determine the cause of aphasia, paralysis, impaired vision and blindness, neuralgia, certain forms of mental disturbance and in certain late traumatic conditions. When properly made under experienced judgment the test is no more hazardous than appendectomy and tonsillectomy. The ratio of lumbar puncture tests to trephine tests in Dr. Carpenter's work has been about 2:1; 50 per cent of the lumbar puncture tests and 13 per cent of the trephine tests have given negative results. A fatal outcome that might be attributed to the test occurred in approximately 8 per cent of the patients when the trephine test was employed, but all of these patients were in the terminal stages of tumor of the brain and usually were in a semiconscious condition or in coma. At an early stage in the work two patients with hydrocephalus from a tumor which could not be removed by an operation died within one week after the test when the air was not properly removed. These facts have been based on the study of approximately 1,000 injuries to the head, 1,000 cases of headache and 1,000 cases of convulsive and dream states. The injection of air had been used in about 200 cases. The discomfort and danger accompanying the use of these procedures, under proper and experienced judgment, is small compared with the information gained in this otherwise almost hopeless class of cases.

DISCUSSION

DR. ALLEN B. KANAVEL: I agree with Dr. Carpenter in regard to the necessity for careful study of the eyegrounds, the vestibular reaction and nystagmus in the diagnosis of lesions of the brain.

I have a very conservative feeling in regard to the injection of air through the occipital region in relation to the diagnosis of tumor of the brain. Grant collected over 300 cases in which this procedure had been carried out in patients supposed to have tumor of the brain, and the mortality was 10 per cent. In that group of cases there was only 6 per cent in which the surgeon and neurologist were able to obtain information that was of absolute value in the diagnosis, and in only 2 per cent did they obtain data that could not have been obtained otherwise. Consequently, it seems to me that the injection of air in cases in which the patient is thought to have tumor of the brain should

be made only when no other method of diagnosis is possible. The danger of death, not only on the operating table but two or three days later, from rupture of a vessel in a glioma is very great. In a certain small percentage of cases in which nothing else will establish a diagnosis I think that one is justified in injecting air into the ventricles.

Concerning the group in which there is no evidence of tumor of the brain, in which there is headache and other symptomatology incident to various lesions, I feel that the group presented by Dr. Carpenter is so indefinite that it is impossible to determine in which cases air should be injected, but I feel that in the average case the procedure ends in the dissatisfaction of the patient and the sorrow of the physician.

As to the injection of air at the office and allowing the patient to return home the same day, 160 miles or more, I believe that this was a hazardous procedure and that if Dr. Carpenter was able to do this successfully he has been fortunate.

Dr. Joseph C. Beck: During the last meeting of the American Medical Association, in Dallas, I visited Dr. Carpenter's office in company with Dr. Halstead of Syracuse, and was shown roentgenograms and some patients who had been treated. I decided that it would be well worth while to invite Dr. Carpenter to come to Chicago and present his material before the Society for discussion. Up to that time I had not seen the perimeter used by Dr. Carpenter, and I had never used air in the diagnosis of any tumor that had come under my observation. I am entirely in accord with Dr. Kanavel concerning the danger of the procedure. When Dr. Carpenter told me he carried out the work in his office, and showed me the apparatus, I lost interest in the matter to a large extent. I went so far as to interrogate persons outside of Dr. Carpenter's office, for I wished to get the full facts and to hear from the patients themselves, and I am sure there is no question about the results that have been obtained.

I had two cases in which I felt that air should be used as a diagnostic measure. I consulted Dr. George Davenport, and he advised against the procedure in those particular cases. I now feel that its use would have been a mistake. In one hypophysial case (which was presented earlier in the evening) Dr. Davenport thought there was a suprasellar tumor because of the marked ocular changes. The patient did not have headache, but had atrophy of one optic nerve and temporal hemianopsia in the other eye. I operated by turning down a flap and exposing the region of the sella, but did not find evidence of intracranial tumor. I then operated through the nose by the trans-sphenoidal route, but did not go as far as the hypophysis. I discovered a large number of polyps which did not show by the usual methods of diagnosis, as they were situated under the middle turbinate body and through the sinus. I performed a thorough intranasal sinus operation. The patient evidently still had the sellar dystrophy but his vision had increased from 20/70 to 20/30. The diagnosis of hypophysial tumor was made by Dr. Ellett of Memphis, who also took the fields of vision which I had shown and which were typical of marked contraction of the field of vision.

I wish to emphasize the persistency of Dr. Carpenter in working under great handicaps, and I am sure he did not use air in as large a number of patients as would appear from the pictures he presented. I expect to have him see a patient of mine whose condition has resisted all efforts at diagnosis, and in whose case an intraventricular injection may prove necessary.

DR. J. HOLINGER: In the case of a patient who was under observation in the department of medicine at the University of Illinois the diagnosis lay between multiple sclerosis and tumor of the brain. The roentgenogram showed atrophy of the posterior clinoid processes, but no tumor. An article in the *Schweiz. Med. Wochenschrift,* June, 1926, explained just such questionable observations. Experiments on the cadaver were reported, in which pressure was exerted in little rubber bulbs inserted between the dura and the bone of different parts of the posterior fossa. It was demonstrated by means of manometers that the pressure would always transmit in the direction of the sella. Even from points as much as 5 cm. away from the sella the pressure would be transmitted directly toward the sella, thereby causing atrophy of the clinoid process. A tumor may, therefore, be situated at a distance of 5 cm. from the sella and still cause atrophy of the clinoid processes through transmission of pressure by means of the cerebrospinal fluid.

DR. CARPENTER: I am particularly interested in this work and wish to emphasize the importance of the air tests. There has been a great deal of criticism in regard to these tests. I reported doing the lumbar puncture test in my office to show the facility with which it can be performed. I would rather do a lumbar puncture test in my office than a tonsillectomy, and I believe that a larger percentage of patients die as the result of tonsillectomy than as the result of the lumbar puncture tests, even under local anesthesia. The lumbar puncture test should be made under ether anesthesia in order to avoid severe reactions. I agree with Frazier that about 30 per cent of tumors of the brain cannot be localized by clinical symptoms alone, and that the air tests and similar aids are absolutely necessary. In 100 patients with tumors of the brain I was able to localize the trouble in practically all cases, and some of the patients are living who I am sure would have died had I not used the air test. A boy with a suprasellar cyst, but without calcified areas or localizing symptoms, recovered after the treatment of the cyst by an injection with Zenker's fluid. A man developed convulsions sixteen years after an abscess of the brain. On examination a cystic cavity was found which was drained by puncture into the lateral ventricle, with complete recovery of the patient. It has been my experience that many lesions of the brain can be relieved by proper diagnosis, and that from 40 to 50 per cent of these patients should be cured or greatly improved, whereas not over 10 to 15 per cent are being helped materially at present.

Recently I have not had the facilities for doing work on deep brain tumors as I should like to do it. Some hospitals are not especially interested in the work and are not properly equipped for it, and at times I have sent patients to other places, thinking that possibly they could be cared for to better advantage. In the cases of six consecutive patients so referred, in whose cases thorough study had been made by various tests and the diagnosis and treatment had been outlined, other examiners disagreed with me in four instances, but operation and the future course of the cases showed that I was right in all of them. I believe every doubtful case should be studied and worked out with these tests, because the clinical symptoms so often are misleading. The tests are understood by few men, and I think it is unfortunate that there is so much unfavorable discussion and criticism about such valuable adjuncts to diagnosis. I believe that in time the air tests will prove to be the greatest asset in the study of obscure lesions of the brain.

Regular Monthly Meeting, Dec. 6, 1926

ARTHUR M. CORWIN, M.D., *President, in the Chair*

PTERYGOMAXILLARY ABSCESS AS ACUTE MASTOID COMPLICATION. Presented by DR. JEROME STRAUSS.

A boy, aged 8, with a negative history, was first seen on March 23, 1925, with an acute otitis media on the left side, which required paracentesis twenty-four hours later. The infection was not severe, and for eleven days ran the usual course. On April 3, there was a definite increase in the amount of discharge and an evening rise of temperature to 100.6 F. The patient complained of short attacks of moderate pain around the ear. There was an edematous thickening of the drum in the area of the incision with some pouting of the wound, and pulsation was again apparent after being absent for five or six days. On April 6 the discharge was again profuse, and the patient complained of pain, which was increased by deglutition, over the entire left side of the face. There was marked tenderness over the mastoid process, particularly near the tip. The canal filled rapidly, and there was a suggestion of swelling in the posterior wall. The afternoon temperature was 102 F. The next day the symptoms were markedly increased, with apparent localization over the middle of the zygoma. The temperature ranged from 90 to 102.8 F. When swallowing the patient screamed in agony. The tenderness over the zygoma was not proportionate to the pain, but the child winced on deep pressure. Swelling was not noted in the temporal or preaural regions, but there was decided limitation of the movement of the mandible. The interincisor opening would scarcely admit two finger-tips. The tenderness over the body of the mastoid was more marked, and there was evidence of edema in the postauricular fold. The external canal showed a constriction due to a flat sagging of the posterior superior wall.

A diagnosis of surgical mastoiditis with involvement of the zygomatic cells was made. On April 8, Dr. George E. Shambaugh was called in consultation and agreed in the diagnosis. At that time mandibular action was practically absent, and deglutition was still more painful. Operation was advised and performed the same day, with Dr. Shambaugh assisting. A roentgenogram showed a pneumatic mastoid process which was definitely cloudy as compared to the right side. The osseous trabeculae were apparently not broken down. The white cell count was 13,400. A culture of the blood gave negative results. A culture from the aural discharge showed a hemolytic streptococcus. At operation all the mastoid cells were found to contain pus, and there was evidence of softening of the bone in several areas. The antrum was readily exposed and curetted free of thickened mucosa, granulations and pus. Through the upper angle of the incision the zygomatic root was opened and explored. Three small cells were found in this structure, each with normal mucosa and with no evidence of suppuration. The exploration exposed an area of dura 0.5 cm. in diameter. Drains were inserted, with partial closure of the incision in the skin. Following operation the symptoms were not improved, and the failure to discover an inflammatory focus in any of the zygomatic cells left the diagnosis still undefined.

Within twenty-four hours after opening the mastoid the facial pain became rapidly more acute, and morphine given hypodermically gave relief for not

more than ten to twenty minutes. Examination by internists elicited the diagnosis of a probable encephalitis. Forty-eight hours after operation the first external evidence of marked tenderness was apparent, 1 cm. in front of the auricle and a little above the superior margin of the zygoma. Pressure at this point caused severe paroxysms of pain. It was necessary to administer morphine hypodermically from one to four times in each twenty-four hours, in addition to codeine combined with various non-narcotic analgesics for thirteen days following the mastoid operation, and during this period the patient rarely slept more than two to three hours per day. On the sixth day a slight preaural swelling was apparent, the white cell count was 16,000, and the evening temperature was 102 F. A second set of roentgenograms failed to localize a deep-seated lesion. On the tenth day the swelling was sufficient to disturb the facial outline, and tenderness was extreme. The white cell count was 18,000, the highest temperature 103 F. Three days later there was a definite subdermal fluctuation centering over the junction of the middle and posterior thirds of the zygoma.

Preparation was made to incise for drainage, but during the struggle incident to the first stage of nitrous oxide anesthesia the abscess ruptured into the mastoid wound, filling the cavity and dressings with a large quantity of pus. An effort was made to locate the abscess at the point of recent fluctuation by needle, but without success. There was marked improvement following the evacuation of pus, and it was hoped that drainage through the mastoid wound would be sufficient to effect a cure. Within five days, however, all the symptoms returned, including the severe pain and fluctuating swelling. Two days later, twenty-one days after the mastoid operation, it was possible to insert a large drain through the crucial incision into the superficial portion of the abscess. The wound drained freely for seventy-two hours and slightly for two more days. There was gradual improvement in all symptoms, the pain disappearing within a week, at which time the mouth could be opened sufficiently to admit three fingers between the incisors. There was no choice but to localize the origin of the process in the pterygomaxillary fossa.

DISCUSSION

DR. J. GORDON WILSON: I consider it important to have such a full report of this case. Considering the relation of the pterygomaxillary space to the middle ear and the tube, one would have thought that such cases were not so rare as they appear to be. A few years ago I reported to the Society a case of acute otitis media with pain in the pterygomaxillary region. The child died of acute endocarditis, and at postmortem there was found decrease of the tympanic ring and the adjacent bone, with an abscess in the pterygomaxillary space.

DR. OTTO STEIN: What was the appearance of the throat?

DR. JEROME STRAUSS: When the mouth could be opened and the throat examined no evidence of a pathologic condition was found. It was impossible at the time of the acute fixation to get an instrument into the mouth. The postnasal space was palpated under anesthesia, but nothing could be felt.

DR. STEIN: I think it is rather unusual that no evidence of an inflammatory process was found in the throat. I recall a paper on this subject by Dr. Mosher seven or eight years ago that went into the matter thoroughly, and I had a

similar case that I reported personally before the Society several years ago. In most cases of this type swelling and sometimes fluctuation is found in the throat, because this forms in the inner boundary of the pterygomaxillary fossa. It is not uncommon to find the inflammatory process of a peritonsillar abscess or a retropharyngeal process extending into the pterygomaxillary space, but not necessarily going on to the formation of an abscess. The lymphatic gland located in that space receives drainage from the back of the nose and the throat, and that is the gland that is supposed to be affected by drainage from the lymphatics at any space around this region, aside from the gravity method which Dr. Strauss mentioned in his paper. Infection can reach this space from all sides, even from a vertebral abscess of the tuberculous type, and from an abscess of the parotid gland.

In handling a case of this type, I think it is recognized that the abscess can be reached by the method referred to by Dr. Dean in opening retropharyngeal abscesses, from the outside of the neck. An incision along the anterior border of the sternocleidomastoid muscle and blunt dissection will reach the region and evacuate the abscess. The possibility of involvement of the jugular vein from this region should be remembered. I recall a patient of Dr. Barck's in St. Louis, whose case he reported in connection with a series of complicated mastoid cases. It was an ordinary case of chronic otorrhea, in which the usual operation was performed and tissues were removed from the mastoid and antrum. There was extension to the sigmoid portion of the sinus. A few days later, because of change in symptoms, he exposed the sigmoid sinus and removed a clot. Following this, blood flowed from above but not from below, so he stopped and packed the wound. The patient became septic, and the jugular vein was ligated, but fluid blood was found in it. The symptoms gradually progressed, with fatal termination. At necropsy a large abscess was found in the pterygomaxillary fossa, and a suppurating sinus was traced from that region up through the emissary vein to the sigmoid sinus.

Dr. Joseph Beck: I did not know that this was such a rare condition. I have presented two cases, one of which had been diagnosed as Pott's disease, but an abscess was found in the pterygomaxillary fossa when an operation was performed. One of the most striking cases of the kind that I have seen was in consultation with Dr. Mundt. In that case Dr. Mundt had incised what he considered a peritonsillar abscess behind the posterior pillar. This procedure failed to relieve the severe pain and limitation of motion of the upper jaw. The patient died. A complete necropsy was not permitted, but sufficient evidence was shown to demonstrate that the abscess extended over the eustachian tube and into the pterygomaxillary area, in which it had ruptured.

The whole subject was worked up well and brought out by the late Dr. Holmes, of Boston, who showed the various routes through which infection can travel in this area. The late Dr. John B. Murphy also brought out some work on ankylosis of the lower jaw known to be due to infection in the pterygomaxillary fossa which was neglected and allowed to remain for a long time. If the infection occurs in children and is neglected, it interferes with development of the jaw, and if it is bilateral the jaws are small and receding.

Dr. Strauss has made an interesting and instructive presentation.

Dr. Samuel Salinger: Referring to the point brought out by Dr. Stein regarding swelling and fluctuation, I had a case similar to that reported by Dr. Strauss in which, however, the symptoms did not appear until two weeks after the mastoid operation. The patient complained of sore throat, and exam-

ination revealed a slight swelling which he thought was a peritonsillitis. Later there was spontaneous rupture, which proved that it does not necessarily follow that an abscess must open into the pharynx early.

DR. JOHN A. CAVANAUGH: I believe that this condition could be best explained by anatomic defects occurring in the development of the fissura glaseri. Gruber has stated that in cases where the crista tympanica and tegmen tympani fail to unite the tympanic cavity affords communication by his fissure with the pterygomaxillary fossae.

DR. NORVAL PIERCE: In examining the anatomy of this part one could readily believe that pus originating in this region or above it could take almost any course, posteriorly, anteriorly, downward. Given a perforation of the zygomatic cell or, better, the squamal cell, the course of the pus will be determined by its relationship to the deep fascia at the base of the skull, which will direct it downward and forward, inward or outward. The symptoms in each type will be altogether different. If it is inward there will be swelling beneath the anterior pillar; if outward, there will be swelling externally, but not in the pharynx. It seems to me that the best explanation of these cases is to be found in the presence of squamal cells, and I think that not enough is heard of these cells. Some of them are capable of enormous development. One may explore as much as he thinks justifiable, but the patient may fail to improve and have continuance of pain and fever. I have never seen a perforation in the zygomatic fossa proper, but I have seen a number of perforations of the squama and two cases of perforation of tubal cells, with pointing in the pharynx.

DR. STRAUSS: I appreciate the discussion of this case. It was considered only as a complication of acute otitis media and mastoiditis. There was a note of conservatism in the report, owing to the fact that the case occurred in a private patient and close friend, and it was felt from day to day that it would be safe to wait another twenty-four hours before introducing radical methods. After ten days it was evident that pus was present and that the abscess would point laterally. There was no tenderness and no obstruction to nasal breathing, such as would be found with an abscess of the superior pharyngeal wall. I think that a secondary infection from the sigmoid sinus could probably be ruled out, as there were no general symptoms to indicate a phlebitis. It was impossible to find the opening through which the pus burrowed into the mastoid wound in the premature rupture of the abscess.

REVIEW OF RECENT LITERATURE — CRANIAL RESONANCE AND ITS CLINICAL APPLICATION. Presented by DR. ROBERT SONNENSCHEIN.

Cranial resonance and bone conduction have received considerable attention, especially in the German literature, during the past two or three years. Runge, by means of his water filling test, found the prolongation of bone conduction in normal cases much increased, but not in those ears which already had lengthened bone conduction. Demetriades has done considerable work on cranial resonance and has found that dilation of blood vessels due to paralysis of the vasomotors gives increased resonance on the side of the paralysis. Stimulation to the vasomotors gives the opposite reaction. In labyrinthine cases he found that persons with normal ears usually show greater cranial resonance to the right than to the left side. When there is a loss of function of one labyrinth there is a diminished resonance on that side as compared with the opposite side.

Schoen and Goldberger tested head resonance by means of a double phonenscope which connected the examiner's ears with those of the patient by way of the external auditory canals. They claim that by this method they have an objective control of the patient's subjective statements. This method consists principally of two parts:

1. The tuning fork is placed on the head of the patient in the median line of the vertex, the forehead or in the region of one of the nasal accessory sinuses.

2. For control of the patient's perception the tuning fork is placed on the head of the examiner.

Cohen and Nussbaum, in a paper called "A New Method of Testing Hearing," based on the work of Schoen and Goldberger, state that this method is much more rapid than the older ones, that it controls the objective statements of the patient, and that it is so simple that a nurse or another person can make the test in place of the physician. I feel, however, that the latter point is not well taken, and that tests should be carried out by the otologist himself.

George Claus called attention to the fact that the duration of bone conduction varies at times from eight to twenty-five seconds, depending on the manner in which the forks are applied to the head, the firmness of contact between the upper and lower jaws, the position of the angle of the mouth, and other factors. Claus prefers the term "crossed perception, separate phenomenon, cross resonance," to that of crossed resonance, since it describes the facts and does not attempt to explain the origin of the phenomenon. It is well known that when the tuning fork is placed in the median line of the head the latter is divided into two equal parts, but when the stem of the fork is placed lateral to the median line the skull is divided into two unequal portions, the smaller adjacent to the fork, the larger at the opposite side of the head. The sound is thus, as a rule, heard louder on the opposite side of the head to which the fork is placed.

The testing of resonance of the skull is not new, having been studied long ago by Lucae, Troeltach and others.

It must be remembered that the examiner's ears must be normal, or that he knows definitely his own defect. Likewise, it is difficult for many normal persons to recognize lateralization and to know to which side of the head the sound is conducted. If one ear shows a combination of involvement of the middle and inner ear involvement, or if both ears show a pathologic condition, diagonal resonance is at times indefinite or contradictory and the observations difficult of interpretation. Objective hearing tests would be most welcome. Therefore, the various tests mentioned should be thoroughly investigated in order that a definite conclusion regarding their value may be reached. At present, if the standard tests are carefully made and combined with complete clinical examination, ample data for diagnosis of the state of hearing are obtained.

DISCUSSION

DR. WILSON: I believe that there are many problems in cranial acoustic conduction still unsolved. Dr. Sonnenschein's interesting review showed that in some of the papers a clear perception of the means by which the cranial bones can be set in vibration was lacking. It is known that they can be set in vibration by direct application of a sounding body, for example, a tuning fork. It is conceivable that vibrations of a sounding body not in direct contact with the skull can be conveyed by air to the skull and so set up cranial vibra-

tions which ultimately reach the ear. Therefore, two varieties of cranial vibrations are possible: (1) by direct application to the skull of a sounding body; (2) by air conduction from a sounding body not in direct contact with the skull. These are obviously distinct. They ought to be, but are not always, differentiated. There is ample evidence that vibrations from a sounding body directly applied to the cranium can pass through the cranial bones to the cochlea, but I doubt whether sound vibrations of even considerable intensity impinging on the skull are perceived by the ear. He has failed to convince himself that sounds of ordinary intensity conveyed to one ear by a tube or by a telephone are transmitted to the other ear by bone conduction. This is a problem which is frequently met in using the audiometer. If one is testing an ear which has been found by the ordinary clinical tests to be totally deaf, while the other ear has good perception, it not infrequently happens that on increasing the intensity with the telephone receiver applied to the deaf ear the patient appears to hear and locate the sound in the deaf ear. I do not know how much perception there is, but I believe there is no physical evidence that sounds of ordinary intensity can be heard by bone conduction through a tube or telephone receiver.

It has been stated that air vibrations carried to the ear by a tube may be heard by an observer through a stethoscope applied to the skull, the sound vibrations supposedly being transmitted by cranial conduction through the stethoscope to the observer's ears. There are several difficulties about this which I think are not easily explained. If this is bone conduction, it is much less than the sound vibrations conveyed to the stethoscope with a tuning fork held between the teeth. The closer the stethoscope is applied to the skull in the case of the tube, the less distinct is the sound, while with the fork between the teeth it is the more distinct. There has not yet been a satisfactory explanation of an otologic test whose diagnostic value is recognized, the increased bone conduction when the stapes is fixed. The entire subject is intricate. I think it is well to be critical before relying on new tests. At present the old tests are still the most reliable, and in the majority of instances will carry one safely through.

Dr. J. Holinger: I agree with Dr. Sonnenschein and Dr. Wilson in regard to relying on the old, well known tests because their results have been checked up by postmortem observations. The examination by means of phonenscopes and stethoscopes or any other instrument for hearing containing rubber tubes must be cautioned against, for they have been tested, and the rubber tubes have been found deficient. Tobler (Schweiz. med. Wchnschr., October, 1926) made tests and found that, especially for the higher pitches, the conduction of the rubber tube compared to the conduction of pieces of wood of the same size was deficient. The tests have been made by means of electrical apparatus. I think that in listening to sounds of the heart and lungs the hearing of these sounds might prove of value. I believe that it is time to take a stand from the point of view that valuable information is lost by the use of the rubber tubes.

Referring to the audiometer and other diagnostic measures that can be used by the nurse, I believe that dealing with a patient personally gives the physician much insight into his psychology and state of mind, which is lost when this work is left to an assistant or a laboratory.

Dr. Sonnenschein: I agree with Dr. Wilson regarding the conduction of sounds by means of rubber tubing. The great objection that so many persons have offered to this has been that with a hard rubber perforated tip in the

ear, connected by rubber tube to the tuning fork, the sound is transmitted by bone conduction. Physical experiments which were carried out a number of years ago by Dr. Minton and myself, and submitted to various physicists, showed that when using a rubber tube practically all of the sound waves were transmitted by air through the lumen of the tube, and little escaped through the wall of the tube. It was shown that this was true by the fact that in many cases of impairment of the middle ear the hearing *via* tubing was somewhat less than that with the prongs, whereas if the hearing had been via bone conduction it should have been increased with the tip in the ear. I think it is well known that in testing with the whispered voice in conversation the sound waves strike the skull, and some are transmitted through the bones to the ear. When sound travels from one medium into another it is not well transmitted. Sounds travel least rapidly in gases, better in fluids and best in solids. If one strikes a bell under water, the sound will travel three or four times as fast as through the air. If a bell is struck in the air a person under water will not hear it well. One must always consider whether a sound originates in one medium and is heard in the same medium, or whether it arises in one medium and one attempts to hear it in another. The small amount of sound that strikes the skull is not well appreciated.

In reference to the deficiency of rubber tubing in transmitting sounds, I do not see what difference it makes whether one uses rubber tubing or not, for the reason that when testing resonance of the skull one must use a medium pitch, because the natural frequency of the skull to the sound is about 200 double vibrations. If one uses a high pitch the sound will not get much vibration. In making the tests with Dr. Minton, I used a tube 51 cm. long, with a lumen of 0.7 cm. and a wall 1.5 mm. thick. The question of the length of the tubing is not of great physical importance, but one not too wide should be used lest it act as a resonator.

I. Scheibe: My Teaching of Empyema. Caution Against the Use of the Word "Mastoiditis" (Ztschr. f. Hals-, Nasen- u. Ohrenh., vol. 14). Review presented by Dr. Holinger.

Scheibe examined parts of the wall and even whole cells of the mastoid process, which were gouged out by means of large, flat gouges, during the state of inflammation. He takes a strong stand against the word "mastoiditis," and recommends instead the expression "empyema of the mastoid process," or "necrosis." The inflammatory swelling of the lining of the cells produces an absolute or relative occlusion of the necks or openings of the cells, thereby causing retention of the pus, empyema of the cells, increased pressure, absorption of bone all over the wall of the cell and fistulae in the outer plate. The narrowness and unfavorable position of the perforation in the drumhead have nothing to do with the empyema. They are irrelevant for the drainage of the pus from the mastoid cells. Only the empyema of the tympanic cavity and of the antrum breaks through the drum membrane and is drained. This seems to me to explain the fact that many a swollen and extremely painful mastoid process is much improved after a careful inflation and the application of an icebag for a few hours. The swelling of the lining is diminished, thereby allowing drainage of the pus and relief of pressure. *Streptococcus mucosus* usually produces more swelling than other microbes, thereby more often clogging the mouths of the cells and producing empyema. Pressure in the cells causes them to enlarge eccentrically and produce fistulae. The sensation of pulsation which

the patient experiences stops as soon as drainage is established. If it persists after operation, it indicates that another cell contains pus and that the operation was incomplete. As a rule, only one cell is affected. All these deductions hold good in otherwise healthy persons. In badly emaciated patients the course is different. The microscopic examination shows the lining of the empyema-cell thickened up to eighty times its original thickness, the walls eroded by lacunae, the marrow in the neighborhood inflamed, but in no case does the cavity communicate directly with marrow spaces. It seems to me that this contradicts Wittmaack, who attached so much importance to the crevices in the bone. I think it would be difficult to explain extradural abscesses and brain abscesses several inches away from the ear except by contiguity through the diploe, and I should like to ask whether it can be done except by progress of the suppuration along the emissary veins.

Scheibe draws the following conclusions: In operating it is sufficient to drain the cell, or (exceptionally) cells, that contain the empyema and leave the marrow spaces, the other cells, and especially the antrum, alone. The time of recovery noted by him is on an average nineteen days; recurrences in the scar, 3 per cent; and the mortality is 0.55 per cent (one death in 200 operations). After a discussion of the pathologic changes of the bone in connection with Sharpey's fibers, Scheibe gives his reasons why the expression "mastoiditis" is wrong. It is not an inflammation of the whole mastoid process. The marrow spaces are not implicated. Only one or several cells are involved, and if these cells are located in the pars petrosa or along the eustachian tube is it logical to talk of "mastoiditis"?

OTTO FLEISCHMANN: INVESTIGATIONS OF BLOOD CHEMISTRY IN OZENA (Ztschr. f. Hals-, Nasen- u. Ohrenh.,vol. 14). Review presented by DR. HOLINGER.

The study of the causes of ozena pays more and more attention to the possibility of constitutional anomalies. The observations and investigations in this direction have not furnished results which exclude other explanations. The anomalies of the skull, especially the too wide nose, were held responsible, but they are found also in persons without ozena. Siebenmann says that a characteristic of ozena is an abnormally wide nose, but not every wide nose is associated with ozena. Other anomalies of the skull are found, such as absence of the frontal sinus, shortness of the septum and palate, but not associated exclusively with ozena. Christ and Nager drew attention to other constitutional changes, such as absence of fat and perspiration glands in the skin, irregularities of the formation of teeth and hair, which frequently are observed in connection with ozena, but probably not always. Siebenmann also found that 60 per cent of all patients with ozena suffer from nerve deafness.

Another indication to constitutional causes is the relation of ozena to the endocrine glands, as evidenced by the large percentage of female patients who have ozena. Some changes in the sympathetic nervous system, and the fact that several authors claim to have seen improvement in ozena after the injection of epinephrine and hypophysin also point to constitutional causes. However, all these arguments are open to other explanations. This is also true of heredity and the more frequent occurrence of ozena in certain families, for which several family trees are given in the article. All these points are much more in favor of some constitutional cause for ozena and against the theory of infection. Fleischmann reasoned that this fact would probably also appear in a chemical analysis of the blood. I will not enter into all the

technical details of the complicated and difficult work, but will simply give you the conclusions that he draws.

(1) The mineral metabolism of the blood must be considered as normal. (2) After investigation of the metabolism of lipoid substances, cholesterin and lecithin, it soon became apparent that there was some relation between ozena and an absence of cholesterin in the blood.

The fresh cases of ozena showed the lower, the advanced cases, the higher values of cholesterin. All, however, remained below the lowest normal values. The lecithin metabolism of the blood does not show the same regular deviations from the normal as the cholesterin, although some abnormal changes were noted. No parallelism could be found with the clinical data. The cholesterin content of the blood in other chronic inflammatory processes of the nose and paranasal sinuses was investigated. In atrophic rhinitis, also, a deficiency of cholesterin was found. The more serious clinical processes showed a greater deficiency, which is the reverse of what was found in ozena. Six cases of suppuration of the sinuses were examined for comparison, and all showed normal conditions. The general conclusion, therefore, is that a deficiency of cholesterin in the blood is characteristic of ozena and atrophic rhinitis, while patients with hypertrophic rhinitis had normal values. This seems to prove that atrophic rhinitis and ozena are closely related and differ only in intensity.

The manner in which the cholesterin deficiency in the blood affects the cells and thereby explains the occurrence of ozena and atrophic rhinitis is interestingly given by Fleischmann, but is too long to be repeated here. It is evident that it is not necessary to accuse any of the infections of childhood, or suppurative processes in the paranasal sinuses, of being the cause of atrophic rhinitis or ozena. The suppurations in the paranasal sinuses in ozena are only a part of the general process and not the cause of the disease.

Several investigations demonstrated that cholesterin is a part of the membrane of each cell and affords protection for the cell and for the corpuscle of the blood. A deficiency of cholesterin opens the way to all kinds of infections. Therefore, the nose in ozena is an incubator for all kinds of bacteria, even for those that otherwise are never found in a normal nose, or thrive there only under special conditions. On the other hand, this deficiency also explains why persons suffering from ozena are so liable to other infections, as, for example, tuberculosis. The deficiency of cholesterin is the cause, the infection is the effect, and not vice versa. The deficiency of cholesterin is most marked in the beginning, and thereby it creates favorable conditions for the propagation of different micro-organisms. Later the defenses of the organism increase, the cholesterin content comes nearly up to normal and forms a kind of healing process. Treatment with vaccines is logical. There seems to be no doubt that ozena is due to an anomaly of the constitution. The infections are secondary. This does not mean that the deficiency of cholesterin is the only and exclusive cause of ozena, for a wide nose and certain micro-organisms must help to make the picture perfect. The glands of the skin eliminate the cholesterin. A congenital absence or diminution of those glands must have an influence on the cholesterin content of the blood. Everything centers about the question as to the cause of the deficiency, and here heredity points to endocrine factors, especially the thyroid gland, the sexual glands and the spleen. It must be remembered that lecithin and chol-

esterin are in a sense antagonists and are dependent on the vegetative nervous system. The facts that certain occupations predispose to ozena, that poor or poorly nourished persons are more often affected, and that during famines the number of cases of ozena have been nearly doubled, make the dependence on nourishment probable. Further investigations in this direction are necessary. Examination of the carbohydrate metabolism showed that there is no connection between that process and ozena.

DISCUSSION

DR. PIERCE: The Munich Clinic has always been conservative in mastoid surgery, especially in the acute cases, leaving as much bone as possible and removing only that portion of the bone that is obviously affected. From that point of view to the other extreme, where everything is removed, the antrum being reamed out until only the inner tablet of the skull is left, is a long step. I am sure that I have seen cases in which there would have been a relapse and complications if only that portion that seemed to be diseased osseous tissue had been removed. I consider that it is a matter of good judgment as to what to take and what to leave, but it is a vast mistake to remove all the bone enclosing the mastoid antrum if that bone can be conserved. It is only necessary to have a perforation of the floor of the antrum to explore and to drain it thoroughly.

As to the rest of the operation, I think one should always take the bone away down to the bony walls of the sinuses whether it is softened or not. I have made the mistake of leaving the pneumatic spaces at the time of the operation, to be heard from later.

Referring to Dr. Holinger's interesting review of Fleischmann's work, that during the last week in the otolaryngologic laboratory at the College serial sections were made of the aural organ of a fetus in about the eighth month, and there was apparently complete aplasia of the structures normally present in the later walls of the nose. Straight-walled cavities with only the bud of inferior turbinate bodies, without any development of the antrum or any sign of development of the ethmoid cells, were found. This, I think, demonstrates the fact that there are congenital malformations of the antrums of the nose, and I believe that the idea brought forth by Fleischmann will be greatly developed in the future. Nasal troubles, particularly of the hyperplastic type, will probably be found to have a congenital basis. Rarely are profound changes in tissue due to any one cause.

DR. ALFRED LEWY: I think that Dr. Fleischmann's observation of cholesterol in the blood in the presence of ozena is interesting in the light of some work that was presented to the German Otolaryngological Society last year in connection with excess of cholesterol in the blood of patients with ceruminous plugs in the ears. I think it would be well to examine patients with ozena to see if they have the ceruminous plugs.

DR. HOLINGER: The formation of cholesterin in the cholesteatoma cavity or in the external meatus in the cerumen is a process that takes place after secretion, and is due to decomposition of fat, with absence of oxygen.

Book Review

LARYNGEAL TUBERCULOSIS. By FRANK ROBERT SPENCER, M.D., and PHILIP HILLKOWITZ, M.D. Pp. 69. Philadelphia: J. B. Lippincott & Company, 1927.

This is an attractive monograph covering the more important points in connection with this annoying and usually rather serious complication. The text is excellently illustrated by a series of colored drawings artistically made from direct observation by use of the laryngeal mirror. The text is concise enough that the practitioner who sees relatively little of tuberculous conditions can quickly review the subject when the occasion arises.

Directory of Opthalmological and Otolaryngological Societies

NATIONAL

AMERICAN BRONCOSCOPIC SOCIETY

President: Dr. D. Crosby Greene, 23 Bay State Road, Boston, Mass.
Secretary-Treasurer: Dr. Henry B. Orton, 24 Commerce St., Newark, N. J.
Place: Hotel Chelsea, Atlantic City, N. J. Time: May 21, 1927.

AMERICAN LARYNGOLOGICAL ASSOCIATION

President: Dr. Chevalier Jackson, Philadelphia, Pa.
Secretary: Dr. George M. Coates, 1721 Pine St., Philadelphia.
Place: Atlantic City, N. J. Time: May 23-25, 1927.

AMERICAN LARYNGOLOGICAL, RHINOLOGICAL AND OTOLOGICAL SOCIETY

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Secretary: Dr. R. L. Loughran, 33 E. 63d St., New York.
Place: Atlantic City, N. J. Time: May 26-28, 1927.

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Secretary: Dr. Emory Hill, Professional Bldg., Richmond, Va.
Place: Quebec, Canada. Time: June 27-29, 1927.

AMERICAN ACADEMY OF OPHTHALMOLOGY AND OTO-LARYNGOLOGY

President: Dr. Ross Hall Skillern, 1928 Chestnut St., Philadelphia.
Secretary: Dr. William P. Wherry, Medical Arts Bldg., Omaha, Nebr.
Place: Book-Cadillac Hotel, Detroit. Time: September 12-16, 1927.

LOCAL

SECTION ON OTOLOGY AND LARYNGOLOGY OF THE BALTIMORE CITY MEDICAL SOCIETY

Chairman: Dr. Edward A. Looper, 605 Park Ave., Baltimore.
Secretary: Dr. Edwin N. Broyles, 1100 N. Charles St., Baltimore.
Place: 1211 Cathedral St. Time: 8:30 p. m. last Friday of each month.

CHICAGO LARYNGOLOGICAL AND OTOLOGICAL SOCIETY

President: Dr. Arthur M. Corwin, 25 E. Washington St., Chicago.
Secretary: Dr. Austin A. Hayden, 25 E. Washington St., Chicago.
Place: Grill Room, Stevens Restaurant, 16 N. Wabash Ave. Time: 6 p. m., first Monday of each month from October to May.

CINCINNATI OTO-LARYNGOLOGICAL SOCIETY

President: Dr. Frederick W. Lamb, Provident Bank Bldg., Cincinnati.
President-Elect: Dr. Walter Murphy, 707 Race St., Cincinnati.
Secretary-Treasurer: Dr. Harris H. Vail, 24 E. 8th St., Cincinnati.
Place: University Club. Time: 6:45 p. m. on second Tuesday of each month from October to May.

THE OPHTHALMOLOGICAL AND OTOLARYNGOLOGICAL SECTION OF THE CLEVELAND ACADEMY OF MEDICINE

Chairman: Dr. W. J. Abbott, 8314 Euclid Ave., Cleveland.
Secretary: Dr. A. L. Stotter, 1148 Euclid Ave., Cleveland.
Place: Winton Hotel. Time: Fourth Friday of each month.

THE COLORADO OTO-LARYNGOLOGICAL SOCIETY

President: Dr. David A. Strickler, Empire Bldg., Denver.
Secretary: Dr. C. Howard Darrow, Metropolitan Bldg., Denver.
Place: Assembly Room of Metropolitan Bldg. Time: First Saturday of each month from October to May.

THE KANSAS CITY EYE, EAR AND NOSE SOCIETY

President: Dr. Joseph W. Kimberlin, Rialto Building, Kansas City, Mo.
Secretary: Dr. A. E. Eubank, 636 Argyle Bldg., Kansas City, Mo.
Time: Third Thursday of each month from September to May; the November, January and March meetings are devoted to clinical work.

THE SECTION ON LARYNGOLOGY AND RHINOLOGY OF THE NEW YORK ACADEMY OF MEDICINE

Chairman: Dr. John E. Welch, 138 W. 70th Street, New York.
Secretary: Dr. Arthur Nilsen, 40 E. 41st St., New York.
Time: 8:30 p. m., on fourth Wednesday of each month from October to May.

THE OTOLOGICAL SECTION OF NEW YORK ACADEMY OF MEDICINE

Chairman: Dr. J. L. Maybaum, 12 E. 86th Street, New York.
Secretary: Dr. R. T. Atkins, 4 W. 53d St., New York.
Place: 103d St. and Fifth Ave. Time: Second Friday of each month from October to May.

THE SECTION ON OTOLOGY AND LARYNGOLOGY OF THE COLLEGE OF PHYSICIANS OF PHILADELPHIA

Chairman: Dr. Fielding O. Lewis, 261 S. 17th Street, Philadelphia.
Clerk: Dr. James A. Babbit, 1912 Spruce St., Philadelphia.
Place: College of Physicians. Time: 8:30 p. m. on third Wednesday of each month from October to June.

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President: Dr. Charles J. Coffey, 221 Grand Ave., Milwaukee.
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Secretary: Dr. M. B. Selingstein, 801 Union and Planters Bank Bldg., Memphis.

Place: Eye Clinic of Memphis Eye, Ear, Nose and Throat Hospital. Time: 8 p. m., second Tuesday of each month.